



**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**In re Application of:**

Kinsman et al.

**Serial No.:** 09/538,684

**Filed:** March 30, 2000

**For:** VARIED-THICKNESS HEAT SINK  
FOR INTEGRATED CIRCUIT (IC)  
PACKAGE (as amended)

**Confirmation No.:** 8722

**Examiner:** D. Graybill

**Group Art Unit:** 2822

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**BRIEF ON APPEAL**

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This brief is submitted as a single copy pursuant to 37 C.F.R. § 41.37 and in the format required by 37 C.F.R. § 41.37(c) (1).

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1) REAL PARTY IN INTEREST

The real party in interest is Micron Technology, Inc., a corporation of the State of Delaware, having a place of business at 8000 South Federal Way, Boise, Idaho 83707-006, Reel/Frame 8632/0612.

2) RELATED APPEALS AND INTERFERENCES

Neither Appellants, the Appellants' representative, nor the Assignee is aware of any pending appeal or interference which would directly affect, be directly affected by, or have any bearing on the Board's decision in the present pending appeal.

3) STATUS OF THE CLAIMS

Claims 7, 21, 23 and 32 were withdrawn and are not the subject of this appeal.

Claims 5, 13, 30 and 38 were previously canceled.

Claims 1-4, 6, 8-12, 14-20, 22, 24-29, 31, 33-37 and 39-45 stand rejected.

No claims are allowed

The rejection of claims 1-4, 6, 8-12, 14-20, 22, 24-29, 31, 33-37 and 39-45 is being appealed.

4) STATUS OF AMENDMENTS

No proposed amendments were submitted after the current final rejection.

5) SUMMARY OF THE CLAIMED SUBJECT MATTER

Initially set forth below by Appellants in compliance with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure is a summary and map for appealed independent claims 1, 22, 24, and 25, dependent claims 9-12, 14-18, 19, 34-37, 39-44 followed by additional remarks concerning a general summary of the invention.

Summary and Map for Appealed Independent claim 1

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to independent claim 1, the present invention is directed to an integrated circuit (IC) package 10 having a plurality of leads 16, 46, 76 and a heat sink 28, 58, 88, the plurality of leads 16, 46, 76 having reduced lead inductance (Specification, page 5, lines 10-14, page 6, lines 18-21, page 11, lines 9-12) comprising:

a package body 12, 42, 72;

an integrated circuit die 14, 44, 74 positioned within the package body 12, 42, 72;

a lead frame 18, 48, 78 including a plurality of leads 16, 46, 76 having portions enclosed within the package body 12, 42, 72 that connect to the integrated circuit die 14, 44, 74, the plurality of leads 16, 46, 76 having portions enclosed within the package body 12, 42, 72 forming an area; and

an electrically conductive heat sink 28, 58, 88 positioned at least partially within the package body 12, 42, 72 with a surface of a first portion 26, 56, 86 of the heat sink 28, 58, 88 facing the lead frame 18, 48, 78 in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area (Specification, page 10, lines 19-24, page 12, lines 23-28, page 14, lines 11-16) formed by the plurality of leads 16, 46, 76 of the lead frame 18, 48, 78 having portions enclosed within the package body 12, 42, 72 and with a die-attach area on the surface of the first portion 26, 56, 86 of the heat sink 28, 58, 86

attached to the integrated circuit die 14, 44, 74, a second portion 30, 60, 90 of the heat sink 28, 58, 88 under the die-attach area and the integrated circuit die 14, 44, 74 projecting away from the first portion 26, 56, 86 of the heat sink 28, 58, 88, the heat sink 28, 58, 88 directly coupled to one of a signal voltage and a reference voltage (*Id.*, page 10, line 25-page 11, line 2), the heat sink operating respectively as a signal plane and a ground plane (*Id.*, page 5, lines 14-16, page 11, lines 2-8, page 13, lines 4-8, page 14, lines 20-22) for the plurality of leads 16, 46, 76 of the lead frame 18 reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries. (*Id.*, page 14, lines 24-28; page 8, line 2- page 9, line 6; page 10, lines 14-24; page 11, lines 19-24; page 12, lines 1-6, page 12, line 18- page 13, line 22; page 14, lines 6-16).

#### **Summary and Map for Appealed dependent claim 9**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 9, the present invention is directed to an integrated circuit package 10, wherein the heat sink 28, 58, 88 is coupled to a printed circuit board 96 outside the package body 12, 42, 72 thereby coupled to one of a signal voltage and a reference voltage. (Specification, page 15, lines 3-5).

#### **Summary and Map for Appealed dependent claim 10**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 10, the present invention is directed to an integrated circuit package 10, wherein the second portion 30, 60, 90 of the heat sink 28, 58, 88 projects substantially to one of a top and a bottom of the package body 12, 42, 72. (Specification, U.S. Patent Application Serial No. 08/888,336, as-filed claim 10).

#### **Summary and Map for Appealed dependent claim 11**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 11, the present invention is directed to an integrated circuit package 10, wherein the heat sink 28, 58, 88 is positioned within the package body 12, 42, 72 with the surface of its first portion 26, 56, 86 in close proximity to substantially all of the enclosed portion 32, 62, 92 of each of the plurality of leads 16, 46, 76 of the lead frame 18, 48, 78. (Specification, page 11, lines 20-25; page 13, line 19- page 14, line 2; page 15, lines 6-15).

#### **Summary and Map for Appealed dependent claim 12**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 12, the present invention is directed to an integrated circuit package 10, wherein the heat sink 28, 58, 88 is positioned within the package body 12, 42, 72 with its first portion 26, 56, 86 extending substantially to at least one side 33, 63, 93 of the package body 12, 42, 72. (Specification, page 11, lines 20-25; page 13, line 19- page 14, line 2; page 15, lines 6-15).

#### **Summary and Map for Appealed dependent claim 14**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 14, the present invention is directed to an integrated circuit package 10, wherein the first 26, 56, 86 and second 30, 60, 90 portions of the heat sink 28, 58, 88 are integral with one another. (Specification, page 11, lines 6-14; page 13, lines 10-14;

page 14, lines 15-26).

#### **Summary and Map for Appealed dependent claim 15**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 15, the present invention is directed to an integrated circuit package 10, wherein the first 26, 56, 86 and second 30, 60, 90 portions of the heat sink 28, 58, 88 comprise separate parts. (Specification, page 11, lines 6-14; page 13, lines 10-14; page 14, lines 15-26).

#### **Summary and Map for Appealed dependent claim 16**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 16, the present invention is directed to an integrated circuit package 10, wherein the heat sink 28, 58, 88 comprises a plurality of parts, each forming a portion of both the first 26, 56, 86 and second 30, 60, 90 portions of the heat sink 28, 58, 88. (Specification, page 11, lines 6-14; page 13, lines 10-14; page 14, lines 15-26).

#### **Summary and Map for Appealed dependent claim 17**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 17, present invention is directed to an integrated circuit package 10, wherein the surface of the first portion 26, 56, 86 of the heat sink 28, 58, 88 includes a recess 24, 54 in which the die attach area is located. (Specification, page 10, lines 1-6; page 13, lines 3-6).

#### **Summary and Map for Appealed dependent claim 18**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 18, the present invention is directed to an integrated circuit package 10, wherein the heat sink 28, 58, 88 has locking holes 17 therein for locking the heat sink 28, 58, 88 in the integrated circuit package 10. (Specification, page 10, lines 6-11).

#### **Summary and Map for Appealed dependent claim 19**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 19, the present invention is directed to an integrated circuit package 10, comprising an adhesive 38, 66 attaching the lead frame 18, 48, 78 to the heat sink 28, 58, 88. (Specification, page 11, lines 15-18; page 14, lines 4-9).

#### **Summary and Map for Appealed Independent claim 22**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, 1C, and Fig. 2 and referring to independent claim 22, the present invention is directed to [a]n electronic system having an input device 102, an output device 104, a memory device 108, and a processor device 106 coupled to the input, output, and memory devices 102, 104, 108, at least one of the input, output, memory, and processor devices 102, 104, 108, 106 including an integrated circuit package 10, 40, 70 having a plurality of leads 16, 46, 76 and a heat sink 28, 58, 88, the plurality of leads having reduced lead inductance (Specification, page 5, lines 10-14, page 6, lines 18-21, page 11, lines 9-12) comprising:

a package body 12, 42, 72;  
an integrated circuit die 14, 44, 74 positioned within the package body 12, 42, 72;  
a lead frame 18, 48, 78 including a plurality of leads 16, 46, 76 having portions enclosed within the package body 12, 42, 72 that connect to the integrated circuit die 14, 44, 74, the plurality of leads 16, 46, 76 having portions enclosed within the package body 12, 42, 72 forming an area; and  
an electrically conductive heat sink 28, 58, 88 positioned at least partially within the package body 12, 42, 72 with a surface of a first portion 26, 56, 86 of the heat sink 28, 58, 88 facing the lead frame 18, 48, 78 in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area (*Id.*, page 10, lines 19-24, page 12, lines 23-28; page 14, lines 11-16) formed by the plurality of leads 16, 46, 76 of the lead frame 18, 48, 78 having portions enclosed within the package body 12, 42, 72 forming an area and having a die-attach area on the surface of the first portion 26, 56, 86 of the heat sink 28, 58, 88 attached to the integrated circuit die 14, 44, 74, a second portion 30, 60, 90 of the heat sink 28, 58, 88 under the die-attach area and the integrated circuit die 14, 44, 74 projecting away from the first portion 26, 56, 86 of the heat sink 28, 58, 88 and the integrated circuit die 14, 44, 74 reducing lead inductance of the plurality of leads 16, 46, 76 of the lead frame 18, 48, 88 at least about 0.90 nanohenries. (*Id.*, page 14, lines 24-28; page 8, line 2- page 9, line 6; page 10, lines 14-24; page 11, lines 19-24; page 12, lines 1-6, page 12, line 18- page 13, line 22; page 14, lines 6-16).

#### **Summary and Map for Appealed Independent claim 24**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to independent claim 24, the present invention is directed to [a]n integrated circuit package 10, 40, 70 having a plurality of leads 16, 46, 76 and a heat sink 28, 58, 88, the plurality of leads 16, 46, 76 having a reduced lead inductance (Specification, page 5, lines 10-14, page 6, lines 18-21, page 11, lines 9-12) comprising:

a package body 12, 42, 72;  
an integrated circuit die 14, 44, 74 positioned within the package body 12, 42, 72;  
a lead frame 18, 48, 78 including a plurality of leads 16, 46, 76 having portions enclosed within the package body 12, 42, 72 that connect to the integrated circuit die 14, 44, 74, the plurality of leads 16, 46, 76 having portions enclosed within the package body 12, 42, 72 forming an area; and  
an electrically conductive heat sink 28, 58, 88 positioned at least partially within the package body 12, 42, 72 with a vertically extending columnar portion 86 surrounded by a horizontally extending skirt portion 90 having a vertical thickness, said columnar portion 86 having a vertical thickness which is greater than the vertical thickness of said skirt portion 90, and having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion 86, the lead frame attachment surface being attached to the lead frame 18, 48, 78 and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads 16, 46, 76 of the lead frame 18, 48, 78 (*Id.*, page 10, lines 19-24, page 12, lines 23-28, page 14, lines 11-16) having portions enclosed within the package body 12, 42, 72, the die-attach surface being attached to the integrated circuit die 14, 44, 74 reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries. (*Id.*, page 14, lines 24-28; page 8, line 2- page 9, line 6; page 10, lines 14-24; page 11, lines 19-24; page 12, lines 1-6, page 12, line 18- page 13, line 22; page 14, lines 6-16).

#### **Summary and Map for Appealed Independent claim 25**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to independent claim 25, the present invention is directed to [a]n integrated circuit package 10, 40, 70 having heat sink 28, 58, 88 and a plurality of leads 16, 46, 76 having a reduced lead inductance inductance (Specification, page 5, lines 10-14, page 6, lines 18-21, page

11, lines 9-12) comprising:

an integrated circuit die 14, 44, 74;

a lead frame 18, 48, 78 including a plurality of leads 16, 46, 76 having portions that are connected to the integrated circuit die 14, 44, 74, the plurality of leads 16, 46, 76 forming an area; and

an electrically conductive heat sink 28, 58, 88 positioned having a surface of a first portion of the heat sink 28, 58, 88 facing the lead frame 18, 48, 78 in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area 78 (*Id.*, page 10, lines 19-24, page 12, lines 23-28, page 14, lines 11-16) formed by the plurality of leads 16, 46, 76 of the lead frame 18, 48, 78 and with a die-attach area on the surface of the first portion 26, 56, 86 of the heat sink 28, 58, 88 attached to the integrated circuit die 14, 44, 74, a second portion 30, 60, 90 of the heat sink 28, 58, 88 under the die-attach area and the integrated circuit die 14, 44, 74 projecting away from the first portion 26, 56, 86 of the heat sink 28, 58, 88, the heat sink 28, 58, 88 coupled to one of a signal voltage and a reference voltage (*Id.*, page 10, line 25-page 11, line 2) for the heat sink 28, 58, 88 to operate respectively as a signal plane and a ground plane (*Id.*, page 5, lines 14-16, page 11, lines 2-8, page 13, lines 4-8, page 14, lines 20-22) for the plurality of leads 16, 46, 76 of the lead frame 18, 48, 78 reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries. (*Id.*, page 14, lines 24-28; page 8, line 2- page 9, line 6; page 10, lines 14-24; page 11, lines 19-24; page 12, lines 1-6, page 12, line 18- page 13, line 22; page 14, lines 6-16).

#### **Summary and Map for Appealed dependent claim 34**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 34, the present invention is directed to an integrated circuit package 10, wherein the heat sink 28, 58, 88 is coupled to a printed circuit board 96 outside the package body 12, 42, 72 thereby coupled to one of a signal voltage and a reference

voltage. (Specification, page 15, lines 3-5).

#### **Summary and Map for Appealed dependent claim 35**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 35, the present invention is directed to an integrated circuit package 10, wherein the second portion 30, 60, 90 of the heat sink 28, 58, 88 projects substantially to one of a top and a bottom of the package body 12, 42, 72. (Specification, U.S. Patent Application Serial No. 08/888,336, as-filed claim 10).

#### **Summary and Map for Appealed dependent claim 36**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 36, the present invention is directed to an integrated circuit package 10, wherein the heat sink 28, 58, 88 is positioned within the package body 12, 42, 72 with the surface of its first portion 26, 56, 86 in close proximity to substantially all of the enclosed portion 32, 62, 92 of each of the plurality of leads 16, 46, 76 of the lead frame 18, 48, 78. (Specification, page 11, lines 20-25; page 13, line 19- page 14, line 2; page 15, lines 6-15).

#### **Summary and Map for Appealed dependent claim 37**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 37, the present invention is directed to an integrated circuit package 10, wherein the heat sink 28, 58, 88 is positioned within the package body 12, 42, 72 with its first portion 26, 56, 86 extending substantially to at least one side 33, 63, 93 of the package body 12, 42, 72. (Specification, page 11, lines 20-25; page 13, line 19- page 14, line 2;

page 15, lines 6-15).

**Summary and Map for Appealed dependent claim 39**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 39, the present invention is directed to an integrated circuit package 10, wherein the first 26, 56, 86 and second 30, 60, 90 portions of the heat sink 28, 58, 88 are integral with one another. (Specification, page 11, lines 6-14; page 13, lines 10-14; page 14, lines 15-26).

**Summary and Map for Appealed dependent claim 40**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 40, the present invention is directed to an integrated circuit package 10, wherein the first 26, 56, 86 and second 30, 60, 90 portions of the heat sink 28, 58, 88 comprise separate parts. (Specification, page 11, lines 6-14; page 13, lines 10-14; page 14, lines 15-26).

**Summary and Map for Appealed dependent claim 41**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 41, the present invention is directed to [a]n integrated circuit package 10, wherein the heat sink 28, 58, 88 comprises a plurality of parts, each forming a portion of both the first 26, 56, 86 and second 30, 60, 90 portions of the heat sink 28, 58, 88. (Specification, page 11, lines 6-14; page 13, lines 10-14; page 14, lines 15-26).

#### **Summary and Map for Appealed dependent claim 42**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 42, the present invention is directed to an integrated circuit package 10, wherein the surface of the first portion 26, 56, 86 of the heat sink 28, 58, 88 includes a recess 24, 54 in which the die attach area is located. (Specification, page 10, lines 1-6; page 13, lines 3-6).

#### **Summary and Map for Appealed dependent claim 43**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 43, the present invention is directed to an integrated circuit package 10, wherein the heat sink 28, 58, 88 has locking holes 17 therein for locking the heat sink 28, 58, 88 in the integrated circuit package 10. (Specification, page 10, lines 6-11).

#### **Summary and Map for Appealed dependent claim 44**

To comply with the provisions of 37 CFR § 1.41.37 to provide a summary and map of the claimed subject matter of each independent claim being appealed identified by the appropriate line and page of the specification as well as drawing figure, referring to drawing Figs. 1A, 1B, and 1C and referring to dependent claim 44, the present invention is directed to an integrated circuit package 10, comprising an adhesive 38, 66 attaching the lead frame 18, 48, 78 to the heat sink 28, 58, 88. (Specification, page 11, lines 15-18; page 14, lines 4-9).

#### **Additional Remarks Concerning General Summary of the Invention**

The present invention includes an integrated circuit (IC) package 10 having a plurality of leads 16, 46, 76 and a heat sink 28, 58, 88. The plurality of leads 16, 46, 76 has a reduced lead

inductance. (Specification, page 5, lines 10-14, page 6, lines 18-21, page 11, lines 9-12). The IC package 10, 40, 70 includes a package body 12, 42, 72, an integrated circuit die 14, 44, 74 positioned within the package body 12, 42, 72 a lead frame 18, 48, 78 and an electrically conductive heat sink 28, 58, 88. The lead frame 18 may include a plurality of leads 16, 46, 76 having portions enclosed within the package body 12, 42, 72 that connect to the integrated circuit die 14, 44, 74. The plurality of leads 16, 46, 76 having portions enclosed within the package body 12, 42, 72 form an area. The electrically conductive heat sink 28, 58, 88 may be positioned at least partially within the package body 12, 42, 72. A surface of a first portion 26, 56, 86 of the heat sink 28, 58, 88 may face the lead frame 18, 48, 78 in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area (Specification, page 5, lines 10-14, page 10, lines 19-24, page 12, lines 23-28, page 14, lines 11-16) formed by the plurality of leads 16, 46, 76 of the lead frame 18, 48, 78 having portions enclosed within the package body 12, 42, 72. A die-attach area on the surface of the first portion 26, 56, 86 of the heat sink 28, 58, 88 may be attached to the integrated circuit die 14, 44, 74. A second portion 30, 60, 90 of the heat sink 28, 58, 88 under the die-attach area and the integrated circuit die 14, 44, 74 may project away from the first portion 26, 56, 86 of the heat sink 28, 58, 88. (Specification, page 8, line 2- page 9, line 6; page 10, lines 14-24; page 11, lines 19-24; page 12, lines 1-6, page 12, line 18- page 13, line 22; page 14, lines 6-16).

The heat sink 28, 58, 88 may be directly coupled to one of a signal voltage and a reference voltage. (*Id.*, page 10, line 25- page 11, line 2). The heat sink 28, 58, 88 may operate respectively as a signal plane and a ground plane (Specification, page 5, lines 14-16, page 11, lines 2-8, page 13, lines 4-8, page 14, lines 20-22) for the plurality of leads 16, 46, 76 of the lead frame reducing lead inductance of the plurality of leads 16, 46, 76 of the lead frame at least about 0.90 nanohenries. (*Id.*, page 14, lines 24-28; page 8, line 2- page 9, line 6; page 10, lines 14-24; page 11, lines 19-24; page 12, lines 1-6, page 12, line 18- page 13, line 22; page 14, lines 6-16).

In one embodiment, the electrically conductive heat sink 28, 58, 88 may be positioned at least partially within the package body 12, 42, 72 and may include a vertically extending columnar portion surrounded by a horizontally extending skirt portion having a vertical thickness. (FIGs. 1A, 1B, 1C). The columnar portion may include a vertical thickness which is greater than the vertical thickness of the skirt portion and may include a lead frame attachment

surface proximate a die-attach surface substantially vertically aligned with the columnar portion. (*Id.*). The lead frame attachment surface may be attached to the lead frame 18, 48, 78 and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area (*Id.*, page 5, lines 10-14, page 10, lines 19-24, page 12, lines 23-28, page 14, lines 11-16) formed by the plurality of leads 16, 46, 76 of the lead frame having portions enclosed within the package body 12, 42, 72, the die-attach surface being attached to the integrated circuit die 14, 44, 74 reducing lead inductance of the plurality of leads 16, 46, 76 of the lead frame at least about 0.90 nanohenries. (*Id.*, page 14, lines 24-28; page 8, line 2- page 9, line 6; page 10, lines 14-24; page 11, lines 19-24; page 12, lines 1-6, page 12, line 18- page 13, line 22; page 14, lines 6-16).

The present invention also includes an integrated circuit (IC) package 10, 40, 70 having a plurality of leads 16, 46, 76 and a heat sink 28, 58, 88. The plurality of leads 16, 46, 76 has a reduced lead inductance. (*Id.*, page 5, lines 10-14, page 6, lines 18-21, page 11, lines 9-12). The IC package 10, 40, 70 includes an integrated circuit die 14, 44, 74, a lead frame 18 and an electrically conductive heat sink 28, 58, 88. The lead frame 18, 48, 78 may include a plurality of leads 16, 46, 76 which form an area. The electrically conductive heat sink 28, 58, 88 may include a surface of a first portion 26, 56, 86 facing the lead frame 18, 48, 78 in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area (*Id.*, page 5, lines 10-14, page 10, lines 19-24, page 12, lines 23-28, page 14, lines 11-16) formed by the plurality of leads 16, 46, 76 of the lead frame 18, 48, 78. A die-attach area on the surface of the first portion 26, 56, 86 of the heat sink 28, 58, 88 may be attached to the integrated circuit die 14, 44, 74. A second portion 30, 60, 90 of the heat sink 28, 58, 88 under the die-attach area and the integrated circuit die 14, 44, 74 may project away from the first portion 26, 56, 86 of the heat sink 28, 58, 88. (*Id.* page 8, line 2- page 9, line 6; page 10, lines 14-24; page 11, lines 19-24; page 12, lines 1-6, page 12, line 18- page 13, line 22; page 14, lines 6-16).

The heat sink 28, 58, 88 may be directly coupled to one of a signal voltage and a reference voltage. (*Id.*, page 10, line 25- page 11, line 2). The heat sink 28, 58, 88 may operate respectively as a signal plane and a ground plane (*Id.*, page 5, lines 14-16, page 11, lines 2-8, page 13, lines 4-8, page 14, lines 20-22) for the plurality of leads 16, 46, 76 of the lead frame reducing lead inductance of the plurality of leads 16, 46, 76 of the lead frame at least about 0.90

nanoheneries. (*Id.*, page 14, lines 24-28; page 8, line 2- page 9, line 6; page 10, lines 14-24; page 11, lines 19-24; page 12, lines 1-6, page 12, line 18- page 13, line 22; page 14, lines 6-16).

The present invention also includes electronic system having an input device 102, an output device 104, a memory device 108, and a processor device 106 coupled to the input device 102, output device 104, and memory device 108. At least one of the input device 102, output device 104, memory device 108, and processor device 106 may include an integrated circuit package 10, 40, 70 having a plurality of leads 16, 46, 76 and a heat sink 28, 58, 88. The plurality of leads 16, 46, 76 may have reduced lead inductance. (*Id.*, page 14, lines 23-28).

The electronic system includes a package body 12, 42, 72, an integrated circuit die 14, 44, 74 positioned within the package body 12, 42, 72, a lead frame 18 and an electrically conductive heat sink 28, 58, 88. The lead frame 18, 48, 78 may include a plurality of leads 16, 46, 76 having portions enclosed within the package body 12, 42, 72 that connect to the integrated circuit die 14, 44, 74. The plurality of leads 16, 46, 76 having portions enclosed within the package body 12, 42, 72 form an area. The electrically conductive heat sink 28, 58, 88 may be positioned at least partially within the package body 12, 42, 72. A surface of a first portion 26, 56, 86 of the heat sink 28, 58, 88 may face the lead frame 18, 48, 78 in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads 16, 46, 76 of the lead frame 18, 48, 78 having portions enclosed within the package body 12, 42, 72. A die-attach area on the surface of the first portion 26, 56, 86 of the heat sink 28, 58, 88 may be attached to the integrated circuit die 14, 44, 74. A second portion 30, 60, 90 of the heat sink 28, 58, 88 under the die-attach area and the integrated circuit die 14, 44, 74 may project away from the first portion 26, 56, 86 of the heat sink 28, 58, 88. The integrated circuit die 14, 44, 74 reducing lead inductance of the plurality of leads 16, 46, 76, of the lead frame at least about 0.90 nanoheneries. (*Id.*, page 14, lines 24-28; page 8, line 2- page 9, line 6; page 10, lines 14-24; page 11, lines 19-24; page 12, lines 1-6, page 12, line 18- page 13, line 22; page 14, lines 6-16).

6). GROUND OF REJECTION TO BE REVIEWED

A. Whether claims 1-4, 6, 8, 11, 12, 14-16, 18-20, 24-29, 31, 33, 36, 37 and 39-45 are unpatentable under 35 U.S.C. § 102(b) as being anticipated by Hernandez (U.S. Patent 4,994,936).

B. Whether claims 1-4, 6, 8-12, 14-20, 22, 24-29, 31, 33-37 and 39-45 are unpatentable under 35 U.S.C. § 103(a) over Hernandez (U.S. Patent 4,994,936).

C. Whether claims 1-4, 6, 8, 11, 12, 14-16, 18-20, 24-29, 31, 33, 36, 37 and 39-45 are unpatentable under 35 U.S.C. § 103(a) over Hernandez (U.S. Patent 4,994,936) in view of Wark (U.S. Patent 5,696,031).

D. Whether claims 9 and 10 are unpatentable under 35 U.S.C. § 103(a) over Hernandez (U.S. Patent 4,994,936) in view of Inasaka (U.S. Patent 5,136,471).

E. Whether claims 9 and 10 are unpatentable under 35 U.S.C. § 103(a) over Hernandez (U.S. Patent 4,994,936) in view of Inasaka in view of Wark (U.S. Patent 5,696,031).

F. Whether claim 17 is unpatentable under 35 U.S.C. § 103(a) over Hernandez (U.S. Patent 4,994,936) in view of Nakamura (JP5102338).

G. Whether claim 17 is unpatentable under 35 U.S.C. § 103(a) over Hernandez (U.S. Patent 4,994,936) in view of Nakamura and Wark (U.S. Patent 5,696,031).

H. Whether claim 22 is unpatentable under 35 U.S.C. § 103(a) over Hernandez (U.S. Patent 4,994,936) in view of Wark (U.S. Patent 5,696,031).

I. Whether claims 34 and 35 are unpatentable under 35 U.S.C. § 103(a) over Hernandez (U.S. Patent 4,994,936) in view of Inasaka (U.S. Patent 5,136,471).

J. Whether claims 34 and 35 are unpatentable under 35 U.S.C. § 103(a) in view of Hernandez (U.S. Patent 4,994,936) in view of Inasaka (U.S. Patent 5,136,471) and Wark (U.S. Patent 5,696,031).

7) ARGUMENT

(i) 35 U.S.C. § 102

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

- a. **Claims 1-4, 6, 8, 11, 12, 14-16, 18-20, 24-29, 31, 33, 36, 37 and 39-45 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Hernandez (U.S. Patent 4,994,936).**

Hernandez describes a molded integrated circuit package incorporating a decoupling capacitor. The decoupling capacitor comprises ceramic dielectric sandwiched between conductive layers. (Hernandez, col. 2, lines 20-39). A die support platform 22 of a lead frame 10 supports an IC chip 28 which is wire bonded 30, 32 to fingers 16 of the lead frame 10. (Hernandez, col. 4, lines 37-44). A decoupling capacitor 34, 68 is attached directly to an IC lead frame using conductive adhesive 46. (*Id.* at col. 4, lines 49-52; col. 5, lines 2-5). Leads extending from the capacitor are attached to fingers of the lead frame by welding or soldering. In one embodiment, the decoupling capacitor 34, 68 includes a hole through which a heat sink plug 60 is disposed. (*Id.* at FIG. 21). The heat sink plug 60 is attached to the decoupling capacitor 34, 68 via an insulator layer 61 and adhesive and the heat sink plug 60 is attached to the IC chip 28 via a thermally conductive adhesive. (*Id.* at col. 7, lines 9-11).

i. **Claims 1 - 4, 6, 8 and 20**

Appellants assert that the claimed invention of presently claimed independent claim 1 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

By way of contrast with Hernandez, claim 1 recites “[a]n integrated circuit package having a plurality of leads and a heat sink, the plurality of leads having reduced lead inductance comprising: a package body; an integrated circuit die positioned within the package body; a lead frame including a plurality of leads having portions enclosed within the package body that

connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area; and an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” Appellants respectfully submit that Hernandez fails to disclose, either expressly or inherently, every element of claim 1.

Specifically, Hernandez fails to describe, either expressly or inherently, each and every element of the claimed invention, such as, “an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Instead, Hernandez describes a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to describe the claim limitation of the element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the

“electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 of Hernandez does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 of Hernandez is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Further, Hernandez fails to describe the element of the claimed invention where “the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 1. As stated, the decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 1, Hernandez cannot anticipate claim 1. Accordingly, the rejection of independent claim 1, and dependent claims 2- 4, 6, 8, and 20 therefrom, should be reversed.

## **ii. Dependent Claim 11**

Appellants assert that the claimed invention of presently claimed dependent claim 11 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Claim 11 of the presently claimed invention recites “The integrated circuit package of claim 1, wherein the heat sink is positioned within the package body with the surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame.” Hernandez fails to disclose, either expressly or inherently, each and every element of dependent claim 11 and independent claim 1 from which claim 11 depends.

Hernandez describes a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to describe the claim limitation of the element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in independent claim 1 or “in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in claim 11. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claims 1 and 11. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the claim limitation of the element of the invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the claim limitation of the element of the invention directed to “the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of

the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 1. As stated, the decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink, then Hernandez fails to disclose, either expressly or inherently, each and every element of the claimed invention such as “the heat sink is positioned within the package body with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 11. Instead, the heat sink plug 60 is only under the IC chip 28 and the decoupling capacitor 34, 68 of Hernandez extends beneath the lead frame. Thus, Hernandez fails to disclose, either expressly or inherently, the claim limitation of the element of the invention directed to a first portion of the heat sink having “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, and “with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 11. (Hernandez, FIGs. 17, 18c and 19).

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 11, Hernandez cannot anticipate claim 11. Accordingly, the rejection of claim 11 should be reversed.

### **iii. Dependent Claim 12**

Appellants assert that the claimed invention of presently claimed dependent claim 12 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in

the claim.

Claim 12 of the presently claimed invention recites “The integrated circuit package of claim 1, wherein the heat sink is positioned within the package body with its first portion extending substantially to at least one side of the package body.” Hernandez fails to disclose, either expressly or inherently, each and every element of dependent claim 12 and independent claim 1 from which claim 12 depends.

Hernandez describes a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to describe each and every element of the claimed invention such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in independent claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in independent claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the element of the claimed invention where “the heat sink [is] directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does

not include each and every element of the electrically conductive heat sink as contained in claim 1. As stated, the decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce "lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries."

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink, then Hernandez fails to disclose, either expressly or inherently, that "the heat sink is positioned within the package body with its first portion extending substantially to at least one side of the package body" as recited in dependent claim 12. Instead, the heat sink plug 60 is only under the IC chip 28 and the decoupling capacitor 34, 68 of Hernandez extends beneath the lead frame. Thus, Hernandez fails to disclose, either expressly or inherently, a first portion of the heat sink having "a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in independent claim 1, and "its first portion extending substantially to at least one side of the package body" as recited in dependent claim 12. (Hernandez, FIGs. 17, 18c and 19).

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 12, Hernandez cannot anticipate claim 12. Accordingly, the rejection of claim 12 should be reversed.

#### **iv. Dependent Claim 14**

Appellants assert that the claimed invention of presently claimed dependent claim 14 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Claim 14 of the presently claimed invention recites "The integrated circuit package of claim 1, wherein the first and second portions of the heat sink are integral with one another." Hernandez fails to disclose, either expressly or inherently, each and every element of dependent claim 14 and independent claim 1 from which claim 14 depends.

Hernandez describes a heat sink plug 60 solely located beneath an IC chip 28. Thus,

Hernandez fails to describe the claim limitation of the element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in independent claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in independent claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the element of the claimed invention where “the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 1. As stated, the decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink,

then Hernandez fails to disclose, either expressly or inherently, that “the first and second portions of the heat sink are integral with one another” as recited in dependent claim 14. Instead, the heat sink plug 60 and decoupling capacitor 34, 68 of Hernandez are separate parts. (Hernandez, FIGs. 17, 18c and 19).

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 14, Hernandez cannot anticipate claim 14. Accordingly, the rejection of claim 14 should be reversed.

#### **v. Dependent Claim 15**

Appellants assert that the claimed invention of presently claimed dependent claim 15 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Claim 15 of the presently claimed invention recites “The integrated circuit package of claim 1, wherein the first and second portions of the heat sink comprise separate parts.” Hernandez fails to disclose, either expressly or inherently, each and every element of dependent claim 15 and independent claim 1 from which claim 15 depends.

Hernandez describes a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to describe the claim limitation of the element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in independent claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in independent claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached

to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the element of the claimed invention where “the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 1. As stated, the decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Because the decoupling capacitor does not have “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, it cannot be the electrically conductive heat sink element of the claimed invention of claim 1 and 15. Thus, Hernandez only discloses a heat sink plug 60 and, thus, also fails to disclose, either expressly or inherently, that “the first and second portions of the heat sink comprise separate parts” as recited in dependent claim 15.

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 15, Hernandez cannot anticipate claim 15. Accordingly, the rejection of claim 15 should be reversed.

#### **vi. Dependent Claim 16**

Appellants assert that the claimed invention of presently claimed dependent claim 16 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Claim 16 of the presently claimed invention recites "The integrated circuit package of claim 1, wherein the heat sink comprises a plurality of parts, each forming a portion of the first and second portions of the heat sink." Hernandez fails to disclose, either expressly or inherently, each and every element of dependent claim 16 and independent claim 1 from which claim 16 depends.

Hernandez describes a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to describe the claim limitation of the element of the invention directed to "a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame" as recited in independent claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in independent claim 1. Claim 1 recites "a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die." (emphasis added). Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe "the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The Examiner acknowledges that Hernandez fails to disclose "reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 1. As stated, the decoupling capacitor, not the heat sink plug, of

Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce "lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries."

Because the decoupling capacitor does not have "a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" element as recited in independent claim 1, it cannot be the electrically conductive heat sink element of the claimed invention of claim 1 and 16. Thus, Hernandez only discloses a heat sink plug 60 and, thus, also fails to disclose, either expressly or inherently, that "the heat sink comprising a plurality of parts, each forming a portion of both the first and second portions of the heat sink" as recited in dependent claim 16.

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 16, Hernandez cannot anticipate claim 16. Accordingly, the rejection of claim 16 should be reversed.

#### **vii. Dependent Claim 18**

Appellants assert that the claimed invention of presently claimed dependent claim 18 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Dependent claim 18 recites "The integrated circuit package of claim 1, wherein the heat sink has locking holes therein for locking the heat sink in the integrated circuit package." Appellants respectfully submit that Hernandez fails to disclose, either expressly or inherently, every element of dependent claim 18 and independent claim 1 from which it depends.

Hernandez describes a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to describe the claim limitation of the element of the invention directed to "a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame" as recited in claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" as recited in claim 1. Claim 1 recites "a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of

at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the element of the claimed invention where “the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 1. As stated, the decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Hernandez further fails to disclose, either expressly or inherently, that the heat plug 60 includes “locking holes for locking the heat sink in the integrated circuit package” as recited in dependent claim 18. The decoupling capacitor 68 is not an electrically conductive heat sink as recited in claim 18 (and independent claim 1). Thus, the openings 74, 76, 78 within the decoupling capacitor 68 cannot comprise “locking holes for locking the heat sink in the integrated circuit package” as recited in dependent claim 18. Even assuming the decoupling capacitor is an electrically conductive heat sink, Hernandez lacks any disclosure that these

openings 74, 76, 78 allow the heat sink to lock in the integrated package as recited in dependent claim 18. Instead, the openings 74, 76, 78 of Hernandez allow the decoupling capacitor 68 to attach to the heat sink 60.

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 18, Hernandez cannot anticipate claim 18. Accordingly, the rejection of claim 18 should be reversed.

#### **viii. Dependent Claim 19**

Appellants assert that the claimed invention of presently claimed dependent claim 19 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Dependent claim 19 recites “The integrated circuit package of claim 1, further comprising an adhesive attaching the lead frame to the heat sink.” Appellants respectfully submit that Hernandez fails to disclose, either expressly or inherently, every element of dependent claim 19 and independent claim 1 from which it depends.

Hernandez describes a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to describe the claim limitation of the element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink

and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Further, Hernandez fails to describe the element of the claimed invention where “the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 1. As stated, the decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Hernandez further fails to disclose, either expressly or inherently, the element of the claimed invention of “an adhesive attaching the lead frame to the heat sink” as recited in claim 19. Instead, heat plug 60 attaches to decoupling capacitor and IC chip 28, but not the lead frame. (Hernandez, col. 7, lines 1-15). As stated *supra*, the decoupling capacitor 68 is not an electrically conductive heat sink as recited in claim 19 (and independent claim 1).

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 19, Hernandez cannot anticipate claim 19. Accordingly, the rejection of claim 19 should be reversed.

#### **ix. Independent Claim 24**

Appellants assert that the claimed invention of presently claimed independent claim 24 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

By way of contrast with Hernandez, independent claim 24 recites “[a] integrated circuit package having a plurality of leads and a heat sink, the plurality of leads having a reduced lead

inductance comprising: a package body; an integrated circuit die positioned within the package body; a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area; and an electrically conductive heat sink positioned at least partially within the package body with a vertically extending columnar portion surrounded by a horizontally extending skirt portion having a vertical thickness, said columnar portion having a vertical thickness which is greater than the vertical thickness of said skirt portion, and having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body, the die-attach surface being attached to the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” Appellants respectfully submit that Hernandez fails to disclose, either expressly or inherently, each and every element of independent claim 24.

Specifically, Hernandez fails to disclose each and every element of the claimed invention such as “an electrically conductive heat sink positioned at least partially within the package body with a vertically extending columnar portion surrounded by a horizontally extending skirt portion having a vertical thickness, said columnar portion having a vertical thickness which is greater than the vertical thickness of said skirt portion, and having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body, the die-attach surface being attached to the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Instead, Hernandez describes a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to describe the element of the claimed invention directed to “an electrically conductive heat sink . . . with a vertically extending columnar portion surrounded by a horizontally extending skirt portion” as recited in claim 24. Further, Hernandez fails to

describe “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently disclose the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 24. The decoupling capacitor 34, 68, not the heat sink plug 60, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 24, Hernandez cannot anticipate claim 24. Accordingly, the rejection of independent claim 24 should be reversed.

**x. Claims 25-29, 31, 33, and 45**

Appellants assert that the claimed invention of presently claimed independent claim 25 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

By way of contrast with Hernandez, independent claim 25 recites “[a]n integrated circuit package having heat sink and a plurality of leads having a reduced lead inductance comprising: an integrated circuit die; a lead frame including a plurality of leads having portions that are connected to the integrated circuit die, the plurality of leads forming an area; and an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink coupled to one of a signal voltage and a reference voltage for the heat sink to operate respectively as a signal plane and a ground plane for the

plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” Appellants respectfully submit that Hernandez fails to disclose, either expressly or inherently, every element of claim 25.

Specifically, Hernandez fails to disclose each and every element of the claimed invention such as “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink coupled to one of a signal voltage and a reference voltage for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Hernandez fails to describe the claim limitation of the element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25. Instead, Hernandez describes a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Further, Hernandez fails to describe the claim limitation of the element of the invention directed to “the heat sink directly coupled to one of a signal voltage and a reference voltage, for

the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 25. The decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 25, Hernandez cannot anticipate claim 25. Accordingly, the rejection of independent claim 25, and dependent claims 26-29, 31, 33 and 45 therefrom, should be reversed.

#### **xi. Dependent Claim 36**

Appellants assert that the claimed invention of presently claimed dependent claim 36 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Dependent claim 36 recites “The integrated circuit package of claim 25, wherein the heat sink is positioned within the package body with the surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame.” Hernandez fails to disclose, either expressly or inherently, each and every element of dependent claim 36 and independent claim 25 from which claim 36 depends.

Hernandez fails to describe each and every element of the claimed invention such as “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as

recited in independent claim 25. Instead, Hernandez describes a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Further, Hernandez fails to describe the claim limitation of the element of the invention directed to “the heat sink directly coupled to one of a signal voltage and a reference voltage, for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink of claim 25. The decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink, then Hernandez fails to disclose, either expressly or inherently, that “the heat sink is positioned within the package body with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 36. Instead, the heat sink plug 60 is only under the IC chip 28 and the decoupling capacitor 34, 68 of Hernandez extends beneath the lead frame. Thus, Hernandez fails to disclose, either expressly or inherently, the element of the claimed invention directed to a first portion of the heat

sink having “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25, and “with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 36. (Hernandez, FIGs. 17, 18c and 19).

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 36, Hernandez cannot anticipate claim 36. Accordingly, the rejection of claim 36 should be reversed.

#### **xii. Dependent Claim 37**

Appellants assert that the claimed invention of presently claimed dependent claim 37 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Dependent claim 37 recites “The integrated circuit package of claim 25, wherein the heat sink is positioned within the package body with its first portion extending substantially to at least one side of the package body.” Hernandez fails to disclose, either expressly or inherently, each and every element of dependent claim 37 and independent claim 25 from which claim 37 depends.

Hernandez fails to describe each and every element of the claimed invention such as “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25. Instead, Hernandez describes a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is

attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Further, Hernandez fails to describe the element of the claimed invention directed to “the heat sink directly coupled to one of a signal voltage and a reference voltage, for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 25. The decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink, then Hernandez fails to disclose, either expressly or inherently, the claim limitation of the element of the invention directed to “the heat sink [being] positioned within the package body with its first portion extending substantially to at least one side of the package body” as recited in dependent claim 37. Instead, the heat sink plug 60 is only under the IC chip 28 and the decoupling capacitor 34, 68 of Hernandez extends beneath the lead frame. Thus, Hernandez fails to disclose, either expressly or inherently, the claim limitation of the element of the invention of a first portion of the heat sink having “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25, and “its first portion extending substantially to at least one side of the package body” as recited in dependent claim 37. (Hernandez, FIGs. 17, 18c and 19).

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 37, Hernandez cannot anticipate claim 37. Accordingly, the rejection of claim 37 should be reversed.

### **xiii. Dependent Claim 39**

Appellants assert that the claimed invention of presently claimed dependent claim 39 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Dependent claim 39 recites "The integrated circuit package of claim 25, wherein the first and second portions of the heat sink are integral with one another." Hernandez fails to disclose, either expressly or inherently, each and every element of dependent claim 39 and independent claim 25 from which claim 39 depends.

Hernandez fails to describe each and every element of the claimed invention such as "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in independent claim 25. Instead, Hernandez describes a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the claim limitation of the element of the invention directed to "the heat sink directly coupled to one of a signal voltage and a reference voltage, for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The Examiner acknowledges that Hernandez fails to disclose "reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat

sink of Hernandez does not include each and every element of the electrically conductive heat sink of claim 25. The decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce "lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries."

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink, then Hernandez fails to disclose, either expressly or inherently, the claim limitation of the element of the invention directed to "the first and second portions of the heat sink are integral with one another" as recited in dependent claim 39. Instead, the heat sink plug 60 and decoupling capacitor 34, 68 of Hernandez are separate parts. (Hernandez, FIGs. 17, 18c and 19).

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 39, Hernandez cannot anticipate claim 39. Accordingly, the rejection of claim 39 should be reversed.

#### **xiv. Dependent Claim 40**

Appellants assert that the claimed invention of presently claimed dependent claim 40 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Dependent claim 40 recites "The integrated circuit package of claim 25, wherein the first and second portions of the heat sink comprise separate parts." Appellants respectfully submit that Hernandez fails to disclose, either expressly or inherently, every element of dependent claim 40 and independent claim 25 from which it depends.

Hernandez fails to describe each and every element of the claimed invention such as "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in independent claim 25. Instead, Hernandez describes a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling

capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the claim limitation of the element of the invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the claim limitation of the element of the invention directed to “the heat sink directly coupled to one of a signal voltage and a reference voltage, for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 25. The decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Because the decoupling capacitor does not have the claim limitation of the element of the invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, it cannot be the electrically conductive heat sink of claim 1 and 40. Thus, Hernandez only discloses a heat sink plug 60 and, thus, also fails to disclose, either expressly or inherently, the claim limitation of the element of the invention directed to “the first and second portions of the heat sink comprise separate parts” as recited in dependent claim 40.

As Hernandez fails to disclose, either expressly or inherently, each and every element of

claim 40, Hernandez cannot anticipate claim 40. Accordingly, the rejection of claim 40 should be reversed.

**xv. Dependent Claim 41**

Appellants assert that the claimed invention of presently claimed dependent claim 41 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Dependent claim 41 recites “The integrated circuit package of claim 25, wherein the heat sink comprises a plurality of parts, each forming a portion of both the first and second portions of the heat sink.” Hernandez fails to disclose, either expressly or inherently, each and every element of dependent claim 41 and independent claim 25 from which claim 41 depends.

Hernandez fails to describe each and every element of the claimed invention such as “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25. Instead, Hernandez describes a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the claim limitation of the element of the invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the claim limitation of the element of the invention directed to “the heat sink directly coupled to one of a signal voltage and a reference voltage, for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least

about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink of claim 25. The decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Because the decoupling capacitor does not have the claim limitation of the element of the invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25, it cannot be the electrically conductive heat sink of claim 25 and 41. Thus, Hernandez only discloses a heat sink plug 60 and, thus, also fails to disclose, either expressly or inherently, that “the heat sink comprising a plurality of parts, each forming a portion of both the first and second portions of the heat sink” as recited in dependent claim 41.

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 41, Hernandez cannot anticipate claim 41. Accordingly, the rejection of claim 41 should be reversed.

#### **xvi. Dependent Claim 42**

Appellants assert that the claimed invention of presently claimed dependent claim 42 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Dependent claim 42 recites “The integrated circuit package of claim 25, wherein the surface of the first portion of the heat sink includes a recess in which the die-attach area is located.” Appellants respectfully submit that Hernandez fails to disclose, either expressly or inherently, every element of dependent claim 42 and independent claim 25 from which it depends.

Hernandez fails to describe each and every element of the claimed invention such as “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25. Instead, Hernandez describes a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the claim limitation of the element of the invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the claim limitation of the element of the invention directed to “the heat sink directly coupled to one of a signal voltage and a reference voltage, for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink of claim 25. The decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Hernandez further fails to disclose, either expressly or inherently, that the heat plug 60

includes the claim limitation of the element of the invention directed to “a recess in which the die attach area is located.” Instead, the heat sink plug 60 is depicted as a solid component, without any recess therein.

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 42, Hernandez cannot anticipate claim 42. Accordingly, the rejection of claim 42 should be reversed.

#### **xvii. Dependent Claim 43**

Appellants assert that the claimed invention of presently claimed dependent claim 43 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in the claim.

Dependent claim 43 recites “The integrated circuit package of claim 25, wherein the heat sink has locking holes therein for locking the heat sink in the integrated circuit package.” Appellants respectfully submit that Hernandez fails to disclose, either expressly or inherently, every element of dependent claim 43 and independent claim 25 from which it depends.

Hernandez fails to describe each and every element of the claimed invention such as “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25. Instead, Hernandez describes a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the claim limitation of the element of the invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the claim limitation of the element of the invention directed to “the heat sink directly coupled to one of a signal voltage and a reference voltage, for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to disclose “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink as contained in claim 25. The decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Hernandez fails to disclose, either expressly or inherently, that the heat plug 60 includes the claim limitation of the element of the invention directed to “locking holes for locking the heat sink in the integrated circuit package” as recited in dependent claim 43. The decoupling capacitor 68 is not an electrically conductive heat sink as recited in claim 43 (and independent claim 25). Thus, the openings 74, 76, 78 within the decoupling capacitor 68 cannot comprise “locking holes for locking the heat sink in the integrated circuit package” as recited in dependent claim 43. Even assuming the decoupling capacitor is an electrically conductive heat sink as recited in dependent claim 18, Hernandez lacks any disclosure that these openings 74, 76, 78 allow the heat sink to lock in the integrated package.

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 43, Hernandez cannot anticipate claim 43. Accordingly, the rejection of claim 43 should be reversed.

#### **xviii. Dependent Claim 44**

Appellants assert that the claimed invention of presently claimed dependent claim 44 is not anticipated by Hernandez under 35 U.S.C. § 102 because Hernandez does not identically describe each and every element of the claimed invention in as complete detail as contained in

the claim.

Dependent claim 44 recites "The integrated circuit package of claim 25, further comprising an adhesive attaching the lead frame to the heat sink." Appellants respectfully submit that Hernandez fails to disclose, either expressly or inherently, every element of dependent claim 44 and independent claim 25 from which it depends.

Hernandez fails to describe each and every element of the claimed invention such as "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in independent claim 25. Instead, Hernandez describes a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the claim limitation of the element of the invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to describe the claim limitation of the element of the invention directed to "the heat sink directly coupled to one of a signal voltage and a reference voltage, for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The Examiner acknowledges that Hernandez fails to disclose "reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not inherently describe the element of the claimed invention because the heat sink of Hernandez does not include each and every element of the electrically conductive heat sink of claim 25. The decoupling capacitor, not the heat sink plug, of Hernandez extends

beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Hernandez further fails to disclose, either expressly or inherently, the claim limitation of the element of the invention directed to “an adhesive attaching the lead frame to the heat sink” as recited in claim 44. Instead, heat plug 60 attaches to decoupling capacitor and IC chip 28, but not the lead frame. (Hernandez, col. 7, lines 1-15). The decoupling capacitor 68 is not an electrically conductive heat sink as recited in claim 44 (and independent claim 25).

As Hernandez fails to disclose, either expressly or inherently, each and every element of claim 44, Hernandez cannot anticipate claim 44. Accordingly, the rejection of claim 44 should be reversed.

(ii) **35 U.S.C. § 103**

To establish a *prima facie* case of obviousness the prior art reference (or references when combined) **must teach or suggest all the claim limitations**. *In re Royka*, 490 F.2d 981, 985 (CCPA 1974); *see also* MPEP § 2143.03. Additionally, there must be “a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements” in the manner claimed. *KSR Int’l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1742, 167 L.Ed.2d 705, 75 USLW 4289, 82 U.S.P.Q.2d 1385 (2007). To establish a *prima facie* case of obviousness there must be a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). Furthermore, the reason that would have prompted the combination and the reasonable expectation of success must be found in the prior art, common knowledge, or the nature of the problem itself, and not based on the Applicant’s disclosure. *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006); MPEP § 2144. Underlying the obvious determination is the fact that statutorily prohibited hindsight cannot be used. *KSR*, 127 S.Ct. at 1742; *DyStar*, 464 F.3d at 1367.

- a. **Claims 1-4, 6, 8, 11, 12, 14-16, 18-20, 24-29, 31, 33, 36, 37 and 39-45 stand rejected under 35 U.S.C. § 103(a) over Hernandez (U.S. Patent 4,994,936).**

The discussion of Hernandez *supra* is incorporated herein.

**i. Claims 1- 4, 6, 8 and 20**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of independent claim 1 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. Further, the Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez and has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations of the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1. Thus, the Examiner’s statements are insufficient to establish a *prima facie* case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitations of the elements of the electrically conductive heat sink as contained claim 1.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claim limitation of the elements of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner’s statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Additionally, the Examiner fails to address the other claim limitations that Hernandez fails to teach or suggest. By way of contrast with Hernandez, claim 1 recites “[a]n integrated circuit package having a plurality of leads and a heat sink, the plurality of leads having reduced lead inductance comprising: a package body; an integrated circuit die positioned within the package body; a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area; and an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body and with a die-attach area on the surface of the first portion of

the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” Appellants respectfully submit that Hernandez fails to teach or suggest the claim limitations of the elements of claim 1.

Specifically, Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as “an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Instead, Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to teach or suggest the claim limitation of the elements of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area

formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the claim limitation of the element of the invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

To make a *prima facie* case of obviousness, the Examiner must identify “a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements” in the manner claimed. *KSR Int’l Co.* 127 S. Ct. 1727. The reason that would have prompted the combination and the reasonable expectation of success must be found in the prior art, common knowledge, or the nature of the problem itself, and not based on the Applicant’s disclosure. *DyStar Textilfarben*, 464 F.3d at 1367. The Office Action is silent as to how Hernandez could be modified to include the claim limitation of the element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify Hernandez to meet the claim limitations. (*Id.*)

The Office Action fails to identify any problem to be solved or why such a modification of Hernandez would be in the knowledge of one skilled in the art. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The only suggestion of the claim limitation of the element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1 is Appellants’ own disclosure. No showing has been made, other than a hindsight reconstruction of the claim limitations, why it would be obvious to modify Hernandez.

Hernandez fails to teach or suggest the claim limitations of the elements of claim 1 and no motivation exists to modify Hernandez to include the claim limitations regarding the claim limitations of the elements of claim 1. Further, the Examiner has failed to show a reasonable expectation of success exists that the decoupling capacitor of Hernandez could be modified to be

the electrically conductive heat sink element as contained in claim 1. Thus, Hernandez cannot render claim 1 obvious. Accordingly, the rejection of independent claim 1, and dependent claims 2- 4, 6, 8, and 20 therefrom, should be reversed.

## **ii. Dependent Claim 11**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 11 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 11 and claim 1 from which claim 11 depends which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 11. Thus, the

Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitations of the elements of the electrically conductive heat sink as contained claim 11.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce "lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The Office Action is silent as to *how* Hernandez could be modified to include the claim limitation of the element of the invention directed to "a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame" as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 11. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

The rejection fails to address additional claim limitations that are neither taught nor suggested by Hernandez. Claim 11 of the presently claimed invention recites "The integrated circuit package of claim 1, wherein the heat sink is positioned within the package body with the surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame." Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 11 and independent claim 1 from which claim 11 depends.

Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention

such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in independent claim 1 or “in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in claim 11. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1 and 11. Claim 1 from which claim 11 depends recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the claim limitation of the element of the invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1 from which claim 11 depends. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez fails to teach or suggest the claim limitation of the elements of the claimed invention such as “the heat sink [is] positioned within the package body with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 11. Instead, the heat sink plug 60 is only under the IC chip and the decoupling capacitor 34, 68 of Hernandez extends beneath the lead frame. Thus, Hernandez fails to teach or suggest the claim limitation of the element of the invention directed to a first portion of the heat sink having a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, and “with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 11. (Hernandez, FIGs. 17, 18c, and 19).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 1 and 11 has a

specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 1 and 11. Further, the Examiner has failed to identify a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 1 and 11.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 11 and no motivation exists to modify the teachings of Hernandez to include the claim limitations regarding the claim limitations of the elements of the claimed invention, Hernandez cannot render claim 11 obvious. Accordingly, the rejection of claim 11 should be reversed.

### **iii. Dependent Claim 12**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 12 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 12 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 12. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 12.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 12. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner’s statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Claim 12 of the presently claimed invention recites “The integrated circuit package of

claim 1, wherein the heat sink is positioned within the package body with its first portion extending substantially to at least one side of the package body.” Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 12 and independent claim 1 from which claim 12 depends.

The Final Rejection fails to address additional claim limitations which are neither taught nor suggested by Hernandez. Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in independent claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in independent claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the claim limitation of the element of the invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 1 and 12 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 1 and 12. Further, the Examiner has failed to make a showing of a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 1 and 12.

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink, then Hernandez fails to teach or suggest the claim limitation of the element of the invention directed to “the heat sink [being] positioned within the package body with its first portion extending substantially to at least one side of the package body” as recited in dependent claim 12. Instead, the heat sink plug 60 is only under the IC chip 28 and the decoupling capacitor 34, 68 of Hernandez extends beneath the lead frame. Thus, Hernandez fails to teach or suggest a first portion of the heat sink having “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, and “its first portion extending substantially to at least one side of the package body” as recited in dependent claim 12. (Hernandez, FIGs. 17, 18c and 19).

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 12, and no motivation exists, either in the art or in the knowledge of one skilled in the art to modify Hernandez to include the claim limitations regarding the claim limitations of the elements of the claimed invention, Hernandez cannot render claim 12 obvious. Accordingly, the rejection of claim 12 should be reversed.

#### **iv. Dependent Claim 14**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 14 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima*

facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”

*Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 14 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 14. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 14.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 14. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any

motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Claim 14 of the presently claimed invention recites "The integrated circuit package of claim 1, wherein the first and second portions of the heat sink are integral with one another." Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 14 and independent claim 1 from which claim 14 depends.

The Final Rejection is silent as to the remaining claim limitations of the elements of the invention which are neither taught nor suggested by Hernandez. Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as "a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame" as recited in independent claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in independent claim 1. Claim 1 recites "a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die." (emphasis added). Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the claim limitation of the element of the invention of a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 1 and 14 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the

electrically conductive heat sink element as contained in claims 1 and 14. Further, the Examiner has failed to make a showing of a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 1 and 14.

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink, which Appellants do not concede, then Hernandez fails to teach or suggest the claim limitation of the element of the invention of “the first and second portions of the heat sink [being] integral with one another” as recited in dependent claim 14. Instead, the heat sink plug 60 and decoupling capacitor 34, 68 of Hernandez are separate parts. (Hernandez, FIGs. 17, 18c and 19).

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 14, and no motivation exists, either in the art or in the knowledge of a person in the art, to modify Hernandez to include the claim limitations regarding the claim limitations of the elements of the claimed invention, Hernandez cannot render claim 14 obvious. Accordingly, the rejection of claim 14 should be reversed.

#### **v. Dependent Claim 15**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 15 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that

optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”

*Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 15 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 15. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 15.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 15. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim

element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Claim 15 of the presently claimed invention recites "The integrated circuit package of claim 1, wherein the first and second portions of the heat sink comprise separate parts." Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 15 and independent claim 1 from which claim 15 depends.

The Final Rejection is silent as to the remaining claim limitations of the elements of the claimed invention which are neither taught nor suggested by Hernandez. Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as "a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame" as recited in independent claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in independent claim 1. Claim 1 recites "a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die." (emphasis added). Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 1 and 15 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 1 and 15. Further, the Examiner

has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 1 and 15.

Because the decoupling capacitor does not have the element of the claimed invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, it cannot be the first component of the electrically conductive heat sink of claim 1 and 15. Similarly, the heat plug 60 of Hernandez does not have “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body” and cannot be the first component of the electrically conductive heat sink of claim 1 and 15. Accordingly, Hernandez also fails to teach or suggest that “the first and second portions of the heat sink comprise separate parts” as recited in dependent claim 15.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 15, and no motivation exists either within the art or the knowledge of one skilled in the art to modify Hernandez, it cannot render claim 15 obvious. Accordingly, the rejection of claim 15 should be reversed.

#### **vi. Dependent Claim 16**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 16 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant

has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”  
*Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 16 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 16. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 16.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 16. Indeed, Hernandez teaches preventing the

coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Claim 16 of the presently claimed invention recites "The integrated circuit package of claim 1, wherein the heat sink comprises a plurality of parts, each forming a portion of the first and second portions of the heat sink." Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 16 and independent claim 1 from which claim 16 depends.

The Final Rejection is silent as to the remaining claim limitations of the elements of the claimed invention which are neither taught nor suggested by Hernandez. Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as "a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame" as recited in independent claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" of the claimed invention as recited in independent claim 1. Claim 1 recites "a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die." (emphasis added). Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 1 and 16 has a

specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 1 and 16. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 1 and 16.

The decoupling capacitor of Hernandez cannot be the first component of the heat sink of claims 1 and 16 because it does not have the element of the claimed invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1. Thus, Hernandez only teaches a heat sink plug 60 and, thus, also fails to teach or suggest the element of the claimed invention directed to “the heat sink comprising a plurality of parts, each forming a portion of both the first and second portions of the heat sink” as recited in dependent claim 16.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 16, and no motivation exists, either in the art or within the knowledge of one skilled in the art to modify Hernandez, it cannot render claim 16 obvious. Accordingly, the rejection of claim 16 should be reversed.

#### **vii. Dependent Claim 18**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 18 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant

has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”  
*Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 18 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 18. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 18.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 18. Indeed, Hernandez teaches preventing the

coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 18 recites "The integrated circuit package of claim 1, wherein the heat sink has locking holes therein for locking the heat sink in the integrated circuit package." Appellants respectfully submit that Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 18 and independent claim 1 from which it depends. The Final Rejection is silent as to the remaining claim limitations of the elements of the invention which are neither taught nor suggested by Hernandez.

Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as "a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame" as recited in claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 1. Claim 1 recites "a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die." (emphasis added). Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 1 and 18 has a specific shape and location within the package body. The Examiner has not stated what would

motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 1 and 18. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 1 and 18.

Hernandez further fails to teach or suggest that the heat plug 60 includes the element of the claimed invention directed to "locking holes for locking the heat sink in the integrated circuit package" as recited in dependent claim 18. The decoupling capacitor 68 is not an electrically conductive heat sink as recited in claim 18 (and independent claim 1). Thus, the openings 74, 76, 78 within the decoupling capacitor 68 cannot comprise "locking holes for locking the heat sink in the integrated circuit package" as recited in dependent claim 18. Even assuming the decoupling capacitor is an electrically conductive heat sink, Hernandez lacks any disclosure that these openings 74, 76, 78 allow the heat sink to lock in the integrated package as recited in dependent claim 18. Instead, the openings 74, 76, 78 of Hernandez allow the decoupling capacitor 68 to attach to the heat sink 60.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 18, and no motivation exists to modify the teachings of Hernandez, it cannot render claim 18 obvious. Accordingly, the rejection of claim 18 should be reversed.

#### **viii. Dependent Claim 19**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 19 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90

nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 19 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 19. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 19.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat

sink element as contained in claim 1 and claim 19. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 19 recites "The integrated circuit package of claim 1, further comprising an adhesive attaching the lead frame to the heat sink." Appellants respectfully submit that Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 19 and independent claim 1 from which it depends.

The Final Rejection is silent as to the claim limitations of the elements of the invention which are neither taught nor suggested by Hernandez. Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as "a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame" as recited in claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 1. Claim 1 recites "a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die." (emphasis added). Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The

claim limitation of the element of the electrically conductive heat sink of claims 1 and 19 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 1 and 19. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 1 and 19.

Hernandez further fails to teach or suggest the element of the claimed invention directed to “an adhesive attaching the lead frame to the heat sink” as recited in claim 19. As stated, the decoupling capacitor of Hernandez is not the electrically conductive heat sink element of the claimed invention as recited in claims 1 and 19. Further, heat plug 60 of Hernandez attaches to decoupling capacitor and IC chip 28. (Hernandez, col. 7, lines 1-15).

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 19, and no motivation exists, either in the art or in the knowledge of one skilled in the art to modify Hernandez, it cannot render claim 19 obvious. Accordingly, the rejection of claim 19 should be reversed.

#### **ix. Independent Claim 24**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of independent claim 24 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular

unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 24 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 24. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 24.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “said columnar portion [of the electrically conductive heat sink] having a vertical thickness which is greater than the vertical thickness of said skirt portion, and having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body” as recited in claim 24. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 24. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

By way of contrast with Hernandez, independent claim 24 recites "[a] integrated circuit package having a plurality of leads and a heat sink, the plurality of leads having a reduced lead inductance comprising: a package body; an integrated circuit die positioned within the package body; a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area; and an electrically conductive heat sink positioned at least partially within the package body with a vertically extending columnar portion surrounded by a horizontally extending skirt portion having a vertical thickness, said columnar portion having a vertical thickness which is greater than the vertical thickness of said skirt portion, and having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body, the die-attach surface being attached to the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." Appellants respectfully submit that Hernandez fails to teach or suggest the claim limitations of the elements of independent claim 24.

The Final Rejection also fails to address the additional claim elements lacking in Hernandez. Specifically, Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as "an electrically conductive heat sink . . . with a vertically extending columnar portion surrounded by a horizontally extending skirt portion having a vertical thickness, said columnar portion . . . having a lead frame attachment surface

proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body.”

Instead, Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to teach or suggest the element of the claimed invention directed to “an electrically conductive heat sink . . . with a vertically extending columnar portion surrounded by a horizontally extending skirt portion” as recited in claim 24. The heat sink plug 60 of Hernandez does not include a horizontally extending skirt portion. Additionally, the heat sink plug 60 of Hernandez does not have “a lead frame attachment surface proximate a die-attach surface” as recited in claim 24.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claim 24 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claim 24. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claim 24.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 24, and no motivation exists, either within the art or the knowledge of one skilled in the art to modify Hernandez, Hernandez cannot render claim 24 obvious. Accordingly, the rejection of independent claim 24 should be reversed.

#### **x. Claims 25-29, 31, 33, and 45**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of independent claim 25 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable

expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead

frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner’s statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

By way of contrast with Hernandez, independent claim 25 recites “[a]n integrated circuit package having heat sink and a plurality of leads having a reduced lead inductance comprising: an integrated circuit die; a lead frame including a plurality of leads having portions that are connected to the integrated circuit die, the plurality of leads forming an area; and an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink coupled to one of a signal voltage and a reference voltage for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” Appellants respectfully submit that Hernandez fails to teach or suggest the claim limitations of the elements of claim 25.

Specifically, Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead

frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.”

Instead, Hernandez teaches a heat sink plug 60 attached to an IC chip 28, but not “in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of lead” and a decoupling capacitor 34, 68 that extends beneath a lead frame, but is not “attached to the integrated circuit die” as recited in claim 25. The decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claim 25 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claim 25. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claim 25.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 25, Hernandez cannot render claim 25 obvious. Accordingly, the rejection of independent claim 25, and dependent claims 26-29, 31, 33, and 45 therefrom, should be reversed.

#### **xi. Dependent Claim 36**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 36 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations

regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”

*Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 36 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 36. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 36.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the

integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 36. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner’s statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 36 recites “The integrated circuit package of claim 25, wherein the heat sink is positioned within the package body with the surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame.” Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 36 and independent claim 25 from which claim 36 depends.

The Final Rejection is silent as to additional claim limitations of the elements of dependent claim 36 which are neither taught nor suggested by Hernandez. Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25. Instead, Hernandez teaches a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a “die-attach area on the

surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As stated, because the decoupling capacitor does not include a die attachment area, it cannot be the “first portion” of the heat sink element of claim 25. Thus, Hernandez also fails to teach or suggest the element of the claimed invention directed to “the heat sink [being] positioned within the package body with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 36. Instead, the heat sink plug 60 is only under the IC chip 28 and the decoupling capacitor 34, 68 of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez does not include a die attach area. Thus, Hernandez fails to teach or suggest a first portion of the heat sink having the element of the claimed invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25, and “with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 36. (Hernandez, FIGs. 17, 18c and 19).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 25 and 36 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 25 and 36. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 25 and 36.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 36, and no motivation exists to modify Hernandez, it cannot render claim 36 obvious. Accordingly, the rejection of claim 36 should be reversed.

#### **xii. Dependent Claim 37**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 37 because Hernandez does not teach or

suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”

*Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 37 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 37. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 37.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead

inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 37. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner’s statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 37 recites “The integrated circuit package of claim 25, wherein the heat sink is positioned within the package body with its first portion extending substantially to at least one side of the package body.” Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 37 and independent claim 25 from which claim 37 depends.

The Final Rejection is silent as to the additional claim limitations of the elements of the invention that are neither taught nor suggested by Hernandez. Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25.

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink,

then Hernandez fails to teach or suggest that “the heat sink is positioned within the package body with its first portion extending substantially to at least one side of the package body” as recited in dependent claim 37. As stated, the decoupling capacitor of Hernandez cannot be the “first portion” of the electrically conductive heat sink element of claim 25 because the decoupling capacitor does not include “a die-attach area” as recited in claim 25. Instead, Hernandez teaches a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33). Thus, Hernandez fails to teach or suggest a first portion of the heat sink having the element of the claimed invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25, and “its first portion extending substantially to at least one side of the package body” as recited in dependent claim 37. (Hernandez, FIGs. 17, 18c and 19).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 25 and 37 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 25 and 37. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 25 and 37.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 37, and no motivation exists to modify Hernandez to include the claim limitations regarding every element of the claimed invention, it cannot render claim 37 obvious. Accordingly, the rejection of claim 37 should be reversed.

#### **xiii. Dependent Claim 39**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 39 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed

invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 39 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 39. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 39.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a

first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 39. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner’s statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 39 recites “The integrated circuit package of claim 25, wherein the first and second portions of the heat sink are integral with one another.” Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 39 and independent claim 25 from which claim 39 depends.

Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, Hernandez teaches a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a “die-attach area

on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink, then Hernandez fails to teach or suggest the element of the claimed invention that “the first and second portions of the heat sink are integral with one another” as recited in dependent claim 39. Instead, the heat sink plug 60 and decoupling capacitor 34, 68 of Hernandez are separate parts. (Hernandez, FIGs. 17, 18c and 19).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 25 and 39 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 25 and 39. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 25 and 39.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 39, and no motivation exists to modify the teaching of Hernandez, it cannot render claim 39 obvious. Accordingly, the rejection of claim 39 should be reversed.

#### **xiv. Dependent Claim 40**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 40 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 40 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 40. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 40.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17).

Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 40. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 40 recites "The integrated circuit package of claim 25, wherein the first and second portions of the heat sink comprise separate parts." Appellants respectfully submit that Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 40 and independent claim 25 from which it depends.

Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in independent claim 25. Instead, Hernandez teaches a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Because the decoupling capacitor does not have "a die-attach area on the surface of the

first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, it cannot be the electrically conductive heat sink of claim 1 and 40. Thus, Hernandez only teaches a heat sink plug 60 and, thus, also fails to teach or suggest the element of the claimed invention directed to “the first and second portions of the heat sink comprise separate parts” as recited in dependent claim 40.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 25 and 40 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 25 and 40. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 25 and 40.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 40, and no motivation exists to modify Hernandez, it cannot render claim 40 obvious. Accordingly, the rejection of claim 40 should be reversed.

#### **xv. Dependent Claim 41**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 41 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular

unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”

*Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 41 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 41. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 41.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat

sink element as contained in claim 25 and claim 41. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 41 recites "The integrated circuit package of claim 25, wherein the heat sink comprises a plurality of parts, each forming a portion of both the first and second portions of the heat sink." Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 41 and independent claim 25 from which claim 41 depends.

The Final Rejection is silent to additional claim limitations of the elements of dependent claim 41 which are neither taught nor suggested by Hernandez. Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in independent claim 25. Instead, Hernandez teaches a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Because the decoupling capacitor does not have "a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in independent claim 25, it cannot be the first portion of the electrically conductive heat sink element of claim 41.

Similarly, as the decoupling capacitor is not “under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink,” it cannot be the second portion of the electrically conductive heat sink element of claim 41. Thus, Hernandez also fails to teach or suggest the element of the claimed invention directed to “the heat sink comprising a plurality of parts, each forming a portion of both the first and second portions of the heat sink” as recited in dependent claim 41.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 25 and 41 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 25 and 41. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 25 and 41.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 41, and no motivation exists to modify the teachings of Hernandez, it cannot render claim 41 obvious. Accordingly, the rejection of claim 41 should be reversed.

#### **xvi. Dependent Claim 42**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 42 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant

has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”

*Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 42 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 42. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 42.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 42. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 42 recites "The integrated circuit package of claim 25, wherein the surface of the first portion of the heat sink includes a recess in which the die attach area is located." Appellants respectfully submit that Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 42 and independent claim 25 from which it depends.

Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention directed to "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in independent claim 25. Instead, Hernandez teaches a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez further fails to teach or suggest that the heat plug 60 includes the element of the claimed invention directed to "the first portion of the heat sink [including] a recess in which

the die attach area is located.” Instead, the heat sink plug 60 is depicted as a solid component without a recess therein. As stated, the decoupling capacitor cannot be the first portion of the electrically conductive heat sink element of claim 25 and 42.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 25 and 42 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 25 and 42. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 25 and 42.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 42, it cannot render claim 42 obvious. Accordingly, the rejection of claim 42 should be reversed.

#### **xvii. Dependent Claim 43**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 43 because Hernandez claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations

are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”

*Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 43 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 43. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 43.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 43. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any

motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 43 recites "The integrated circuit package of claim 25, wherein the heat sink has locking holes therein for locking the heat sink in the integrated circuit package." Appellants respectfully submit that Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 43 and independent claim 25 from which it depends.

Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, Hernandez teaches a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

The Final Rejection is silent as to the additional claim limitations of the elements of claim 43 which are neither taught nor suggested by Hernandez. Hernandez also fails to teach or suggest that the "heat sink has locking holes for locking the heat sink in the integrated circuit package" as recited in dependent claim 43. The decoupling capacitor 68 is not an electrically conductive heat sink as recited in claim 18 (and independent claim 1). Thus, the openings 74, 76, 78 within the decoupling capacitor 68 cannot comprise "locking holes for locking the heat sink in the integrated circuit package" as recited in dependent claim 43. Even assuming the decoupling capacitor is an electrically conductive heat sink as recited in dependent claim 43,

Hernandez lacks any disclosure that these openings 74, 76, 78 allow the heat sink to lock in the integrated circuit package. Instead, the openings 74, 76, 78 allow the decoupling capacitor to lock into the heat sink. Additionally, the heat sink plug 60 lacks any holes.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The claim limitation of the element of the electrically conductive heat sink of claims 25 and 43 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 25 and 43. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 25 and 43.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 43, and no motivation exists to modify the teachings of Hernandez, it cannot render claim 43 obvious. Accordingly, the rejection of claim 43 should be reversed.

#### **xviii. Dependent Claim 44**

Hernandez cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 44 because Hernandez does not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in Hernandez or within the knowledge of one skilled in the art, to modify Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified to include the claim limitations regarding the elements of the claimed invention.

The Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that

optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.”

*Id.*

These arguments are misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 44 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 44. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 44.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 44. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead

frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention. The Examiner's statements are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 44 recites "The integrated circuit package of claim 25, further comprising an adhesive attaching the lead frame to the heat sink." Appellants respectfully submit that Hernandez fails to teach or suggest the claim limitations of the elements of dependent claim 44 and independent claim 25 from which it depends.

The Final Rejection is silent as to additional claim limitations of elements of claim 44 which are neither taught nor suggested by Hernandez. Hernandez fails to teach or suggest the claim limitations of the elements of the claimed invention such as "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, Hernandez teaches a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez also fails to teach or suggest "an adhesive attaching the lead frame to the heat sink" as recited in claim 44. Instead, heat plug 60 attaches to decoupling capacitor and IC chip 28. (Hernandez, col. 7, lines 1-15). As stated, the decoupling capacitor 68 is not an electrically conductive heat sink as recited in claim 44 (and independent claim 1).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. The

claim limitation of the element of the electrically conductive heat sink of claims 25 and 44 has a specific shape and location within the package body. The Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to be the electrically conductive heat sink element as contained in claims 25 and 44. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified to be the electrically conductive heat sink element as contained in claims 25 and 44.

As Hernandez fails to teach or suggest the claim limitations of the elements of claim 44, and no motivation exists to modify the teachings of Hernandez, it cannot render claim 44 obvious. Accordingly, the rejection of claim 44 should be reversed.

**b. Claims 1-4, 6, 8, 11, 12, 14-16, 18-20, 24-29, 31, 33, 36, 37 and 39-45 stand rejected under 35 U.S.C. § 103(a) over Hernandez (U.S. Patent 4,994,936) in view of Wark (U.S. Patent 5,696,031).**

The discussion of Hernandez *supra* is incorporated herein. Wark teaches or suggests a device and method for stacking wire-bonded integrated circuit dice on flip-chip bonded integrated circuit dice. In addition, Wark teaches or suggests a multi-chip module which is incorporated into a memory device and forms part of an electronic system that includes an input device, an output device, and a processor. The multi-chip module may be incorporated into any of the devices in the module. (Col. 5, lines 59-65). Wark is cited for teaching a "processor" and fails to teach or suggest a heat sink. (Office Action mailed March 21, 2007, page 18).

**i. Claims 1, 2- 4, 6, 8 and 20**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of independent claim 1 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no valid motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." (March 21, 2007, Office Action, page 16). The Examiner further stated "applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical." *Id.*

The Examiner further stated that "it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez." (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking

would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

By way of contrast with Hernandez and Wark, claim 1 recites "[a]n integrated circuit package having a plurality of leads and a heat sink, the plurality of leads having reduced lead inductance comprising: a package body; an integrated circuit die positioned within the package body; a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area; and an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." Appellants respectfully submit that Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 1.

The Final Rejection is silent as to the additional claim limitations of elements of claim 1 which are neither taught nor suggested by Hernandez and Wark. Specifically, Hernandez and Wark fail to teach or suggest the claim limitations of the elements of the claimed invention such as "an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a

ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Similarly, the decoupling capacitor cannot be the second portion of the “electrically conductive heat sink element of claim 1 because it is not “under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink” as required by claim 1. Further, the heat sink plug 60 of Hernandez cannot be the first portion of the electrically conductive heat sink element of claim 1 because the Hernandez heat sink plug 60 is solely located beneath an IC chip 28. Wark lacks any teaching or suggestion of a heat sink. Thus, Hernandez and Wark fail to teach or suggest the element of the claimed invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claim 1. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claim 1 and the Examiner has not stated what would motivate a person of skill in the

art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 1, and no motivation exists to modify Hernandez, Hernandez and Wark cannot render claim 1 obvious. Accordingly, the rejection of independent claim 1, and dependent claims 2- 4, 6, 8, 11, 12, 15, 16 and 20 therefrom, should be reversed.

## **ii. Dependent Claim 11**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 11 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez

because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 11 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 11. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 11.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 11. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Claim 11 of the presently claimed invention recites “The integrated circuit package of claim 1, wherein the heat sink is positioned within the package body with the surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame.” Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 11 and independent claim 1 from which claim 11 depends.

The Final Rejection is silent as to additional claim limitations of elements of claim 1 and 11 that are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty

percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Hernandez further teaches a heat sink plug 60 solely located beneath an IC chip 28 and, thus, cannot be the first portion of the electrically conductive heat sink element of claim 1 and claim 11. Wark lacks any teaching or suggestion of a heat sink. Thus, Hernandez and Wark fail to teach or suggest the claim limitations of the elements of the claimed invention such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1.

As stated, neither the decoupling capacitor nor the heat sink plug of Hernandez can be the “first portion” of the electrically conductive heat sink element of claim 1 and claim 11. Thus, Hernandez also fails to teach or suggest the element of the claimed invention that “the heat sink is positioned within the package body with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 11. Instead, the heat sink plug 60 is only under the IC chip 28 and the decoupling capacitor 34, 68 of Hernandez extends beneath the lead frame. Wark fails to cure the deficiencies Hernandez. Thus, Hernandez and Wark fail to teach or suggest a first portion of the heat sink having “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, and “with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 11. (Hernandez, FIGs. 17, 18c and 19).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim

limitation of the element of the electrically conductive heat sink of claims 1 and 11. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 11 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the processor of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 11, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 11 obvious. Thus, the rejection of claim 11 should be reversed.

### **iii. Dependent Claim 12**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 12 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that "it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez." (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 12 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 12. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the

decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 12.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 12. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Claim 12 of the presently claimed invention recites “The integrated circuit package of claim 1, wherein the heat sink is positioned within the package body with its first portion extending substantially to at least one side of the package body.” Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 12 and independent claim 1 from which claim 12 depends.

The Final Rejection is silent as to additional claim limitations of elements of claim 1 and 12 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” as recited in claim 1 and claim

12, Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Similarly, as the heat sink plug 60 is solely located beneath an IC chip 28, it cannot be the first portion of the electrically conductive heat sink element of claims 1 and 12. Wark lacks any teaching or suggestion of a heat sink. Thus, Hernandez and Wark fail to teach or suggest the claim limitations of the elements of the claimed invention such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1.

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink, then Hernandez and Wark fail to teach or suggest the element of the claimed invention that “the heat sink [being] positioned within the package body with its first portion extending substantially to at least one side of the package body” as recited in dependent claim 12. Instead, the heat sink plug 60 is only under the IC chip 28 and the decoupling capacitor 34, 68 of Hernandez extends beneath the lead frame. Wark fails to teach or suggest a heat sink and cannot cure the deficiencies of Hernandez. Thus, Hernandez and Wark fail to teach or suggest a first portion of the heat sink having “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, and “its first portion extending substantially to at least one side of the package body” as recited in dependent claim 12. (Hernandez, FIGs. 17, 18c and 19).

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim

limitation of the element of the electrically conductive heat sink of claims 1 and 12. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 12 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 12, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 12 obvious. Reversal of the rejection is requested.

#### **iv. Dependent Claim 14**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 14 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that "it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez." (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 14 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 14. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the

decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 14.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 14. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Claim 14 of the presently claimed invention recites “The integrated circuit package of claim 1, wherein the first and second portions of the heat sink are integral with one another.” Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 14 and independent claim 1 from which claim 14 depends.

The Final Rejection is silent as to additional claim limitations of the elements of claim 1 and claim 14 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat

sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28, it cannot be the first portion of the electrically conductive heat sink element of claim 1 and claim 14. Wark lacks any teaching or suggestion of a heat sink. Thus, Hernandez and Wark fail to teach or suggest the claim limitations of the elements of the claimed invention such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1.

Assuming, *arguendo*, that the decoupling capacitor of Hernandez is part of the heat sink, then Hernandez and Wark fail to teach or suggest the element of the claimed invention directed to that “the first and second portions of the heat sink are integral with one another” as recited in dependent claim 14. Instead, the heat sink plug 60 and decoupling capacitor 34, 68 of Hernandez are separate parts. (Hernandez, FIGs. 17, 18c and 19). Wark fails to cure the deficiencies of Hernandez as Wark fails to teach or suggest a heat sink.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 1 and 14. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 14 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art

has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 14, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 14 obvious. Reversal of the rejection is requested.

#### **v. Dependent Claim 15**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 15 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez

teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 15 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 15. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 15.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites

no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 15. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Claim 15 of the presently claimed invention recites “The integrated circuit package of claim 1, wherein the first and second portions of the heat sink comprise separate parts.” Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 15 and independent claim 1 from which claim 15 depends.

Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28 and Wark lacks any teaching or suggestion of a heat sink. Thus, Hernandez and Wark fail to teach or suggest the claim limitations of the elements of the claimed invention such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead

frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Further, Hernandez and Wark fail to teach or suggest the element of the claimed invention directed to “the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Examiner acknowledges that Hernandez fails to teach “reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). Appellants respectfully submit that Hernandez does not teach or suggest this element because the heat sink of Hernandez does not include the claim limitations of the elements of the electrically conductive heat sink of claim 1. As stated, the decoupling capacitor, not the heat sink plug, of Hernandez extends beneath the lead frame. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that such a decoupling capacitor would reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” Further, Wark lacks any teaching or suggestion to overcome the deficiencies of Hernandez.

Because the decoupling capacitor does not have the element of the claimed invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, it cannot be the electrically conductive heat sink of claim 1 and 15. Thus, Hernandez only teaches a heat sink plug 60 and fails to teach or suggest that “the first and second portions of the heat sink comprise separate parts” as recited in dependent claim 15. Wark fails to teach or suggest a heat sink and cannot cure the

deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 1 and 15. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 15 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 15, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 15 obvious. Reconsideration and reversal of the rejection is requested.

#### **vi. Dependent Claim 16**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 16 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another

process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 16 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be

obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 16. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 16.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce "lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to "a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame" as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 16. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

The Final Rejection is silent as to additional claim limitations of elements of claims 1 and 16 which are neither taught nor suggested by Hernandez and Wark. Claim 16 of the presently claimed invention recites "The integrated circuit package of claim 1, wherein the heat sink comprises a plurality of parts, each forming a portion of the first and second portions of the heat sink." Hernandez and Wark fail to teach or suggest the claim limitations of the elements of

dependent claim 16 and independent claim 1 from which claim 16 depends.

Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28 and Wark lacks any teaching or suggestion of a heat sink. Thus, Hernandez and Wark fail to teach or suggest the claim limitations of the elements of the claimed invention such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Because the decoupling capacitor of Hernandez does not teach or suggest the element of the claimed invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 1, it cannot be the electrically conductive heat sink of claim 1 and 16. Thus, Hernandez only teaches a heat sink plug 60 and fails to teach or suggest that “the heat sink comprising a plurality of parts, each forming a portion of both the first and second portions of the heat sink” as recited in dependent claim 16. Wark lacks any disclosure of a heat sink and cannot cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 1 and 16. The

decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 16 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 16, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 16 obvious. Reconsideration and reversal of the rejection is requested.

#### **vii. Dependent Claim 18**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 18 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that "it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez." (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 18 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 18. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the

decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 18. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 18 recites “The integrated circuit package of claim 1, wherein the heat sink has locking holes therein for locking the heat sink in the integrated circuit package.” Appellants respectfully submit that Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 18 and independent claim 1 from which it depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 1 and 18 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed

invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not teach or suggest the element of the claimed invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28, it also cannot be the first portion of the electrically conductive heat sink element of claims 1 and 18. Wark lacks any teaching or suggestion of a heat sink. Thus, Hernandez and Wark fail to teach or suggest the element of the claimed invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1.

Hernandez and Wark also fail to teach or suggest the element of the claimed invention that the heat plug 60 includes “locking holes for locking the heat sink in the integrated circuit package” as recited in dependent claim 18. The decoupling capacitor 68 of Hernandez is not an electrically conductive heat sink as recited in claim 18 (and independent claim 1). Thus, the openings 74, 76, 78 within the decoupling capacitor 68 cannot comprise “locking holes for locking the heat sink in the integrated circuit package” as recited in dependent claim 18. Even assuming the decoupling capacitor of Hernandez is an electrically conductive heat sink as recited in dependent claim 18, Hernandez lacked any disclosure that these openings 74, 76, 78 allow the heat sink to lock in the integrated package. Instead, the openings allow the heat sink to lock into the decoupling capacitor. Further, the heat sink plug of Hernandez lacks holes. Wark fails to cure the deficiencies of Hernandez as Wark fails to teach or suggest a heat sink.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim

limitation of the element of the electrically conductive heat sink of claims 1 and 18. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 18 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 18, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 18 obvious. Reconsideration and reversal of the rejection is requested.

#### **viii. Dependent Claim 19**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 19 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that "it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez." (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 19 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 19. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the

decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 19.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 19. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependant claim 19 recites “The integrated circuit package of claim 1, further comprising an adhesive attaching the lead frame to the heat sink.” Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 19 and independent claim 1 from which claim 19 depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 1 and 19 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1 and 19. Claim 1 recites “a surface of a first portion of the heat

sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not teach or suggest the element of the claimed invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28, it also cannot be the first portion of the electrically conductive heat sink element of claims 1 and 19. Wark lacks any teaching or suggestion of a heat sink. Thus, Hernandez and Wark fail to teach or suggest the claim limitations of the elements of the claimed invention such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1.

Hernandez and Wark also fail to teach or suggest the element of the claimed invention directed to “an adhesive attaching the lead frame to the heat sink” as recited in claim 19. Instead, heat plug 60 attaches to decoupling capacitor and IC chip 28, but not the lead frame. (Hernandez, col. 7, lines 1-15). The decoupling capacitor 68 is of Hernandez not an electrically conductive heat sink as recited in claim 19 (and independent claim 1). Wark fails to cure the deficiencies of Hernandez as Wark fails to teach or suggest a heat sink.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 1 and 19. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 19 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art

has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 19, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 19 obvious. Reconsideration and reversal of the rejection is requested.

#### **ix. Independent Claim 24**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of independent claim 24 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez

teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 24 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 24. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 24.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites

no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “said columnar portion [of the electrically conductive heat sink] having a vertical thickness which is greater than the vertical thickness of said skirt portion, and having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body” as recited in claim 24. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 24. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

The Final Rejection is silent as to additional claim limitations of elements of claim 24 which are neither taught nor suggested by Hernandez and Wark. By way of contrast with Hernandez and Wark, independent claim 24 recites “[a] integrated circuit package having a plurality of leads and a heat sink, the plurality of leads having a reduced lead inductance comprising: a package body; an integrated circuit die positioned within the package body; a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area; and an electrically conductive heat sink positioned at least partially within the package body with a vertically extending columnar portion surrounded by a

horizontally extending skirt portion having a vertical thickness, said columnar portion having a vertical thickness which is greater than the vertical thickness of said skirt portion, and having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body, the die-attach surface being attached to the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” Appellants respectfully submit that Hernandez and Wark fail to teach or suggest the claim limitations of the elements of independent claim 24.

Specifically, Hernandez and Wark fail to teach or suggest fails to teach or suggest the claim limitations of the elements of the claimed invention such as “an electrically conductive heat sink . . . with a vertically extending columnar portion surrounded by a horizontally extending skirt portion having a vertical thickness, said columnar portion . . . having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body.”

Instead, Hernandez teaches a heat sink plug 60 solely located beneath an IC chip 28. Thus, Hernandez fails to teach or suggest the element of the claimed invention directed to “an electrically conductive heat sink . . . with a vertically extending columnar portion surrounded by a horizontally extending skirt portion” as recited in claim 24. The heat sink plug 60 of Hernandez does not include a horizontally extending skirt portion. Additionally, the heat sink plug 60 of Hernandez does not have “a lead frame attachment surface proximate a die-attach surface” as recited in claim 24. Wark lacks any teaching or suggestion of a heat sink or a lead frame and cannot cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claim 24. The decoupling

capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claim 24 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 24, and no motivation exists to modify the teachings of Hernandez, Hernandez and Wark cannot render claim 24 obvious. Accordingly, the rejection of independent claim 24 should be reversed.

**x. Claims 25-29, 31, 33, and 45**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of independent claim 25 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that "it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez." (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor

of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

By way of contrast with Hernandez and Wark, independent claim 25 recites “[a]n integrated circuit package having heat sink and a plurality of leads having a reduced lead inductance comprising: an integrated circuit die; a lead frame including a plurality of leads having portions that are connected to the integrated circuit die, the plurality of leads forming an area; and an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of

at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink coupled to one of a signal voltage and a reference voltage for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” Appellants respectfully submit that Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 25.

The Final Rejection is silent as to additional claim limitations of elements of claim 25 which are neither taught nor suggested by Hernandez and Wark. Specifically, Hernandez and Wark fail to teach or suggest the claim limitations of the elements of the claimed invention such as “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink coupled to one of a signal voltage and a reference voltage for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

Hernandez teaches a heat sink plug 60 attached to an IC chip 28 while a decoupling capacitor 34, 68 extends beneath a lead frame and Wark lacks any teaching or suggestion of a heat sink. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33). Similarly, as the heat sink plug is not in “close proximity to

a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads," the heat sink plug cannot be the first portion of the electrically conductive heat sink element of claim 25.

Thus, Hernandez and Wark fail to teach or suggest the element of the claimed invention directed to "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claim 25. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claim 25 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 25, and no motivation exists to modify the teachings Hernandez, Hernandez and Wark cannot render claim 25 obvious. Accordingly, the rejection of independent claim 25, and dependent claims 26-29, 31, 33, and 45 therefrom, should be reversed.

#### **xi. Dependent Claim 36**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 36 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to

be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." (March 21, 2007, Office Action, page 16). The Examiner further stated "applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical." *Id.*

The Examiner further stated that "it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez." (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been

made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 36 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 36. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 36.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 36. Indeed, Hernandez teaches preventing the

coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 36 recites "The integrated circuit package of claim 25, wherein the heat sink is positioned within the package body with the surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame." Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 36 and independent claim 25 from which claim 36 depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 36 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25 and claim 36. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have the element of the claimed invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33). As the Hernandez heat sink plug 60 is attached to an IC chip 28, but does not extend beneath a lead frame, it cannot be the first portion of the electrically conductive heat sink element of claims 25 and 36. Wark lacks any teaching or suggestion of a heat sink.

Hernandez also fails to teach or suggest the element of the claimed invention directed to "the heat sink [being] positioned within the package body with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame" as recited in dependent claim 36. Instead, the heat sink plug 60 is only under the IC chip 28. While the decoupling capacitor 34, 68 of Hernandez extends beneath the lead frame, it cannot be the first portion of the electrically conductive heat sink element of claims 25 and 36 for

the reasons stated herein. Thus, Hernandez fails to teach or suggest a first portion of the heat sink having the element of the claimed invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25, and “with a surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame” as recited in dependent claim 36. (Hernandez, FIGs. 17, 18c and 19). Wark lacks any disclosure to cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 36. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 25 and 36 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 36, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 36 obvious. Thus, the rejection of claim 36 should be reversed.

#### **xii. Dependent Claim 37**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 37 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." (March 21, 2007, Office Action, page 16). The Examiner further stated "applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical." *Id.*

The Examiner further stated that "it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez." (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking

would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 37 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 37.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 37. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any

motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 37 recites "The integrated circuit package of claim 25, wherein the heat sink is positioned within the package body with its first portion extending substantially to at least one side of the package body." Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 37 and independent claim 25 from which claim 37 depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 37 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33). As the Hernandez heat sink plug 60 is attached to an IC chip 28, but is not in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads," the heat sink plug cannot be the first portion of the electrically conductive heat sink element of claims 25 and 37. Wark lacks any teaching or suggestion of a heat sink.

Hernandez also fails to teach or suggest the element of the claimed invention directed to "the heat sink [being] positioned within the package body with its first portion extending substantially to at least one side of the package body" as recited in dependent claim 37. As stated, the decoupling capacitor does not include a die attach area and cannot be the first portion of the electrically conductive heat sink element as recited in claims 25 and 37. The heat sink plug 60 is solely under the IC chip 28 and is not "positioned within the package body with its first portion extending substantially to at least one side of the package body" as recited in dependent claim 37.

Thus, Hernandez fails to teach or suggest a first portion of the heat sink having the

element of the claimed invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25, and “its first portion extending substantially to at least one side of the package body” as recited in dependent claim 37. (Hernandez, FIGs. 17, 18c and 19). Wark lacks any disclosure to cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 37. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 25 and 37 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 37, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 37 obvious. Thus, the rejection of claim 37 should be reversed.

#### **xiii. Dependent Claim 39**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 39 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead

frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 39 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 39. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 39.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 39. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 39 recites "The integrated circuit package of claim 25, wherein the first and second portions of the heat sink are integral with one another." Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 39 and independent claim 25 from which claim 39 depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 39 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25 and 39. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not teach or suggest the element of the claimed invention directed to a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33)

As the Hernandez heat sink plug 60 is attached to an IC chip 28 but is not in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads," the heat sink plug cannot be the first portion of the electrically conductive heat sink element of claims 25 and 39. Wark lacks any teaching or suggestion of a heat sink and cannot cure the deficiencies of Hernandez.

Hernandez also fails to teach or suggest that "the first and second portions of the heat sink are integral with one another" as recited in dependent claim 39. Instead, the heat sink plug 60 and decoupling capacitor 34, 68 of Hernandez are separate parts. (Hernandez, FIGs. 17, 18c and 19). Wark fails to teach or suggest a heat sink or lead frame and cannot cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 39. The decoupling capacitor of Hernandez is structurally different from the element of the electrically

conductive heat sink of claims 25 and 39 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 39, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 39 obvious. Thus, the rejection of claim 39 should be reversed.

#### **xiv. Dependent Claim 40**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 40 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez

because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 40 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 40. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 40.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 40 recites “The integrated circuit package of claim 25, wherein the first and second portions of the heat sink comprise separate parts.” Appellants respectfully submit that Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 40 and independent claim 25 from which it depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 40 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in

“close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not teach or suggest the element of the claimed invention directed to a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33). As the Hernandez heat sink plug 60 attached to an IC chip 28 but is not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink element of claims 25 and 40. Wark lacks any teaching or suggestion of a heat sink.

Because Hernandez in view of Wark does not teach or suggest that the decoupling capacitor has the element of the claimed invention directed to “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in independent claim 25, it cannot be the electrically conductive heat sink of claim 25 and 40. Thus, Hernandez only teaches a single element heat sink plug 60 and fails to teach or suggest that “the first and second portions of the heat sink comprise separate parts” as recited in dependent claim 40. Wark lacks any teaching to cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 40. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 25 and 40 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 40, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 40 obvious. Thus, the rejection of claim 40 should be reversed.

#### xv. Dependent Claim 41

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 41 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would

prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 41 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 41.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead

frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 41. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 41 recites “The integrated circuit package of claim 25, wherein the heat sink comprises a plurality of parts, each forming a portion of both the first and second portions of the heat sink.” Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 41 and independent claim 25 from which claim 41 depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 41 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

Thus, the decoupling capacitor cannot be the first portion of the electrically conductive heat sink element of claims 25 and 41.

As the Hernandez heat sink plug 60 attached to an IC chip 28 but is not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the

plurality of the leads,” the heat sink plug cannot be the electrically conductive heat sink element of claims 25 and 41. Wark lacks any teaching or suggestion of a heat sink.

As stated, neither the heat sink plug nor the decoupling capacitor of Hernandez can be the first portion of the electrically conductive heat sink element of claims 25 and 41. Wark cannot cure the deficiencies of Hernandez. Thus, Hernandez in view of Wark also cannot teach or suggest that the “heat sink comprises a plurality of parts, each forming a portion of both the first and second portions of the heat sink” as recited in claim 41.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 41. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 25 and 41 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 41, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 41 obvious. Thus, the rejection of claim 41 should be reversed.

#### **xvi. Dependent Claim 42**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 42 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." (March 21, 2007, Office Action, page 16). The Examiner further stated "applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical." *Id.*

The Examiner further stated that "it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez." (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking

would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 42 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 42. Thus, the Examiner’s statements are insufficient to establish a *prima facie* case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 42.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 42. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any

motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 42 recites "The integrated circuit package of claim 25, wherein the surface of the first portion of the heat sink includes a recess in which the die-attach area is located." Appellants respectfully submit that Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 42 and independent claim 25 from which it depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 42 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

While the Hernandez heat sink plug 60 is attached to an IC chip 28, it is not in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads," and also cannot be the first portion of the electrically conductive heat sink element of claims 25 and 42. Wark lacks any teaching or suggestion of a heat sink.

Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have a "recess in which the die-attach area is located" as recited in claim 42. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33). The heat sink plug also lacks a recess in which the die-attach area is located. Wark cannot cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 42. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 25 and 42 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fails to teach or suggest the claim limitations of the elements of claim 42, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 42 obvious. Thus, the rejection of claim 42 should be reversed.

#### **xvii. Dependent Claim 43**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 43 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious

absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 43 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of

the heat sink element of claim 25 and claim 43. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 43.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce "lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 43. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 43 recites "The integrated circuit package of claim 25, wherein the heat sink has locking holes therein for locking the heat sink in the integrated circuit package." Appellants respectfully submit that Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 43 and independent claim 25 from which it

depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 44 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33). While the Hernandez heat sink plug 60 is attached to an IC chip 28, it is not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads.” Thus, the heat sink plug cannot be the first portion of the electrically conductive heat sink element of claims 25 and 43. Wark lacks any teaching or suggestion of a heat sink.

Hernandez and Wark also fail to teach or suggest the element of the claimed invention directed to “locking holes for locking the heat sink in the integrated circuit package” as recited in dependent claim 43. The decoupling capacitor 68 is not an electrically conductive heat sink as recited in claim 18 (and independent claim 1). Thus, the openings 74, 76, 78 within the decoupling capacitor 68 cannot comprise “locking holes for locking the heat sink in the integrated circuit package” as recited in dependent claim 43. Even assuming the decoupling capacitor is an electrically conductive heat sink as recited in dependent claim 18, Hernandez lacked any disclosure that these openings 74, 76, 78 allow the heat sink to lock in the integrated circuit package. Instead, the openings allow the decoupling capacitor and heat sink to connect. The Hernandez heat sink plug lacks locking holes. Wark fails to teach or suggest a heat sink or lead frame and cannot cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 43. The decoupling capacitor of Hernandez is structurally different from the element of the electrically

conductive heat sink of claims 25 and 43 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 43, and no motivation exists to modify the teachings Hernandez, the cited art cannot render claim 43 obvious. Thus, the rejection of claim 43 should be reversed.

#### **xviii. Dependent Claim 44**

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 44 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez

because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 44 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 44. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 44.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 25 and claim 44. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 44 recites “The integrated circuit package of claim 25, further comprising an adhesive attaching the lead frame to the heat sink.” Appellants respectfully submit that Hernandez and Wark fail to teach or suggest the claim limitations of the elements of dependent claim 44 and independent claim 25 from which it depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 44 which are neither taught nor suggested by Hernandez and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Even assuming the decoupling capacitor 34, 68 is in

“close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33). As the Hernandez heat sink plug 60 is attached to an IC chip 28 but is not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink element of claims 25 and 44. Wark lacks any teaching or suggestion of a heat sink.

Hernandez and Wark also fail to teach or suggest the element of the claimed invention directed to “an adhesive attaching the lead frame to the heat sink” as recited in claim 44. Instead, heat plug 60 attaches to decoupling capacitor and IC chip 28, but not the lead frame. (Hernandez, col. 7, lines 1-15). The decoupling capacitor 68 is not an electrically conductive heat sink as recited in claim 44 (and independent claim 1) as it does not have a die attach area as recited in claims 25 and 44. Wark fails to teach or suggest a heat sink or lead frame and cannot cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 44. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 25 and 44 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 44, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 44 obvious. Reconsideration and reversal of the rejection is requested.

**c. Dependent Claims 9 and 10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hernandez in view of Inasaka (U.S. Patent 5,136,471).**

The discussion of Hernandez *supra* is incorporated herein. Inasaka teaches or suggests a laminate wiring board having power source layers. Inasaka is cited for teaching a package body coupled to a printed circuit board outside the package body. (Office Action mailed March 21, 2007, pages 18-19). Inasaka fails to cure the deficiencies of Hernandez.

**i. Dependent Claim 9**

Hernandez in view of Inasaka cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 9 because Hernandez and Inasaka do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Inasaka to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine these disclosures [of a package body coupled to a printed circuit board outside the package body] of the prior art because it would have facilitated the provision of the circuit board, signal voltage and reference voltage of the embodiment of Hernandez applied to claim 1.” (March 21, 2007, Office Action, page 19). This simple conclusory statement fails to identify any problem to be

solved by any knowledge in the art to modify Hernandez to include the teachings of Inasaka. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Inasaka teaches or suggests a multilayer substrate 16 between a lead frame 32 and a chip 30 to form pads for power supply in a step-like configuration.

The references themselves teach away from any proposed combination thereof since Inasaka teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Applicants assert that it would not be obvious to combine a method for stacking power generating integrated circuit devices (Inasaka) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Inasaka. As stated, Inasaka teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Further, connecting a decoupling capacitor to a printed circuit board would likely render the Hernandez device per se inoperable.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 9 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 9. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 9.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 9. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 9 recites “The integrated circuit package of claim 1, wherein the heat sink is coupled to the printed circuit board outside the package body thereby coupled to one of a signal voltage and a reference voltage.”

The Final Rejection is silent as to additional claim limitations of elements of claims 1 and 9 which are neither taught nor suggested by Hernandez and Inasaka. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat

sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28 and not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink of claims 1 and 9. Inasaka lacks any teaching or suggestion of a heat sink.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Inasaka teaches a laminate wiring board. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 1 and 9. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 9 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the laminate wiring board of Inasaka. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the laminate wiring board of Inasaka. Connecting a decoupling capacitor to a printed circuit board would likely render the Hernandez device per se inoperable.

As Hernandez and Inasaka fail to teach or suggest the claim limitations of the elements of the claimed invention, and because no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 9 obvious. Reconsideration and reversal of the rejection is requested.

## **ii. Dependent Claims 10**

Hernandez in view of Inasaka cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 10 because Hernandez and

Inasaka do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Inasaka to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine these disclosures [of a package body coupled to a printed circuit board outside the package body] of the prior art because it would have facilitated the provision of the circuit board, signal voltage and reference voltage of the embodiment of Hernandez applied to claim 1.” (March 21, 2007, Office Action, page 19). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Inasaka. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Inasaka teaches or suggests a multilayer substrate 16 between a lead frame 32 and a chip 30 to form pads for power supply in a step-like configuration.

The references themselves teach away from any proposed combination thereof since Inasaka teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Applicants assert that it would not be obvious to combine a method for stacking power

generating integrated circuit devices (Inasaka) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Inasaka. As stated, Inasaka teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Further, connecting a decoupling capacitor to a printed circuit board would likely render the Hernandez device per se inoperable.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 9 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 9. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 10.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce "lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to "a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame" as recited in claim 1. (March 21, 2007, Office Action, pages

16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 10. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 10 recites "The integrated circuit package of claim 8, wherein the second portion of the heat sink projects substantially to one of a top and bottom of the package body." Appellants respectfully submit that Hernandez in view of Inasaka fails to teach or suggest the claim limitations of the elements of claim 10 and claims 8 and 1 from which claim 10 depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 1 and 10 which are neither taught nor suggested by Hernandez and Inasaka. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 1. Claim 1 recites "a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die." (emphasis added). Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28 and not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink of claims 1 and 10. Inasaka lacks any teaching or suggestion of a heat sink.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Inasaka teaches a laminate wiring board. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 1 and 10. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 10 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the laminate wiring board of Inasaka. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the laminate wiring board of Inasaka.

Hernandez and Inasaka also fail to teach or suggest the element of the claimed invention directed to “a second portion of the heat sink projects substantially to one of a top and a bottom of the package body.” Instead, the heat sink plug 60 of Hernandez only partially extends within a package body 86. (Hernandez, FIGs. 21, 22). Inasaka fails to teach or suggest a heat sink and cannot cure the deficiencies of Hernandez.

As Hernandez and Inasaka fail to teach or suggest the claim limitations of the elements of claim 10, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 10 obvious. Reconsideration and reversal of the rejection is requested.

**d. Dependent Claims 9 and 10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hernandez in view of Inasaka (U.S. Patent 5,136,471) and Wark.**

The discussion of Hernandez, Inasaka and Wark *supra* is incorporated herein.

**i. Dependent Claim 9**

Hernandez in view of Inasaka and Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 9

because Hernandez, Inasaka and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Inasaka and Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). Additionally, the Examiner stated that “it would have been obvious to combine these disclosures [of a package body coupled to a printed circuit board outside the package body] of the prior art because it would have facilitated the provision of the circuit board, signal voltage and reference voltage of the embodiment of Hernandez applied to claim 1.” (March 21, 2007, Office Action, page 19).

These simple conclusory statements fail to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark and Inasaka. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic

system. Inasaka teaches or suggests a multilayer substrate 16 between a lead frame 32 and a chip 30 to form pads for power supply in a step-like configuration.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Inasaka also teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) or power generating integrated circuit devices (Inasaka) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention.

Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Inasaka teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Further, connecting a decoupling capacitor to a printed circuit board would likely render the Hernandez device per se inoperable.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 9 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 9. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the

decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 9.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 9. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 9 recites “The integrated circuit package of claim 1, wherein the heat sink is coupled to the printed circuit board outside the package body thereby coupled to one of a signal voltage and a reference voltage.”

The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface

of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28 and not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink of claims 1 and 9. Inasaka and Wark lack any teaching or suggestion of a heat sink.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Inasaka teaches a laminate wiring board and Wark teaches a processor. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 1 and 9. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 9 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the features of the laminate wiring board of Inasaka or the processor of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the laminate wiring board of Inasaka or the processor of Wark. Connecting a decoupling capacitor to a printed circuit board and processor would likely render the Hernandez device per se inoperable.

As Hernandez, Inasaka and Wark fail to teach or suggest the claim limitations of the elements of the claimed invention, and because no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 9 obvious. Reconsideration and reversal of the rejection is requested.

## **ii. Dependent Claims 10**

Hernandez in view of Inasaka and Wark cannot establish a *prima facie* case of

obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 10 because Hernandez and Inasaka do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Inasaka and Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). Additionally, the Examiner stated that “it would have been obvious to combine these disclosures [of a package body coupled to a printed circuit board outside the package body] of the prior art because it would have facilitated the provision of the circuit board, signal voltage and reference voltage of the embodiment of Hernandez applied to claim 1.” (March 21, 2007, Office Action, page 19).

These simple conclusory statements fail to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark and Inasaka. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the

integrated circuit dice to achieve greater component density in the construction of an electronic system. Inasaka teaches or suggests a multilayer substrate 16 between a lead frame 32 and a chip 30 to form pads for power supply in a step-like configuration.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Inasaka also teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) or power generating integrated circuit devices (Inasaka) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention.

Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Inasaka teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Further, connecting a decoupling capacitor to a printed circuit board would likely render the Hernandez device per se inoperable.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 10 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 10. Thus, the Examiner's statements are insufficient

to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 10.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 10. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 10 recites “The integrated circuit package of claim 8, wherein the second portion of the heat sink projects substantially to one of a top and bottom of the package body.” Appellants respectfully submit that Hernandez in view of Inasaka and Wark fails to teach or suggest the claim limitations of the elements of claim 10 and claims 8 and 1 from which claim 10 depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 1 and 10 which are neither taught nor suggested by Hernandez, Wark and Inasaka. The decoupling

capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28 and not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink of claims 1 and 10. Inasaka and Wark lack any teaching or suggestion of a heat sink.

Hernandez, Inasaka and Wark also fail to teach or suggest the element of the claimed invention directed to “a second portion of the heat sink projects substantially to one of a top and a bottom of the package body.” Instead, the heat sink plug 60 of Hernandez only partially extends within a package body 86. (Hernandez, FIGs. 21, 22). Inasaka and Wark fail to teach or suggest a heat sink and cannot cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Inasaka teaches a laminate wiring board and Wark teaches a processor. None of the references teach the claim limitation of the element of the electrically conductive heat sink of claims 1 and 10. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 10 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the features of the laminate wiring board of Inasaka or the processor of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner

has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the laminate wiring board of Inasaka or the processor of Wark.

As Hernandez, Inasaka and Wark fail to teach or suggest the claim limitations of the elements of claim 10, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 10 obvious. Reconsideration and reversal of the rejection is requested.

**e. Claim 17 stands rejected under 35 U.S.C. §103 over Hernandez in view of Nakamura.**

The discussion of Hernandez *supra* is incorporated herein. Nakamura teaches a heat conduction object 6 disposed in recess 7 of a circuit board 1. (Nakamura, FIG. 1 and FIG. 3).

Hernandez in view of Nakamura cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 17 because Hernandez and Nakamura do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Nakamura to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a heat conduction object 6 disposed in recess 7 of a circuit board 1] of Nakamura with the

disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the heat transmission of Hernandez, enable die alignment and adhesive containment as disclosed by Inasaka, it would hold the die, reduce mounting height, increase mounting density, enable plating bar cutting and reduce cost.” (March 21, 2007, Office Action, pages 19-20). This conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Nakamura. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Nakamura teaches or suggests a heat conduction object 6 disposed in recess 7 of a circuit board 1.

The references themselves teach away from any proposed combination thereof since Nakamura teaches away from lead frames and encapsulating IC packages since doing so would prevent the reduced mounting height configuration wherein the circuit board has heat sink disposed within an opening therein. Applicants assert that it would not be obvious to combine a method which involves disposing a heat sink attached to an IC chip in an opening in a circuit board (Nakamura) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the lead frame. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Nakamura. As stated, Nakamura teaches away from incorporating a lead frame, heat sink and decoupling device in an encapsulated IC package since it would be render Nakamura ineffective for its stated objectives.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 17 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 17. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the

decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 17.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 17. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

Dependent claim 17 recites “The integrated circuit package of claim 1, wherein the surface of the heat sink includes a recess in which the die-attach area is located.” Appellants respectfully submit that Hernandez in view of Nakamura fails to teach or suggest the claim limitations of the elements of claim 17 and 1 from which claim 17 depends.

The Final Rejection is also silent as to additional claim limitations of elements of claims 1 and 17. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 1. Claim 1 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the

enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28 but is not in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame, the heat sink plug cannot be the first portion of the electrically conductive heat sink element of claims 1 and 17. Nakamura teaches a heat sink 6 disposed in a recess in a circuit board 1. Nakamura lacks any teaching or suggestion of a lead frame and also cannot teach that the heat sink 6 is in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame as recited in claim 1. Thus, Hernandez and Nakamura fail to teach or suggest the claim limitations of the elements of the claimed invention such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1.

Hernandez and Nakamura also fail to teach or suggest the element of the claimed invention directed to “the first portion of the heat sink [including] a recess in which the die-attach area is located.” Instead, the heat sink plugs of Hernandez and Nakamura lack recesses.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Nakamura teaches a heat sink disposed in a recess of a circuit board. Neither of the references teach the claim limitation of the element of the electrically conductive heat sink of claims 1 and 17. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 17 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the features of the heat sink of Nakamura. No problem in the art has been identified that would

motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the heat sink of Nakamura.

As Hernandez and Nakamura fail to teach or suggest the claim limitations of the elements of claim 17, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 17 obvious. Reconsideration and reversal of the rejection is requested.

**f. Claim 17 stands rejected under 35 U.S.C. §103 over Hernandez in view of Nakamura and Wark.**

The discussion of Hernandez, Nakamura and Wark *supra* is incorporated herein.

Hernandez in view of Nakamura and Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 17 because Hernandez, Nakamura and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Nakamura and Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez

because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18).

The Examiner further stated that “it would have been obvious to combine this disclosure [of a heat conduction object 6 disposed in recess 7 of a circuit board 1] of Nakamura with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the heat transmission of Hernandez, enable die alignment and adhesive containment as disclosed by Nakamura, it would hold the die, reduce mounting height, increase mounting density, enable plating bar cutting and reduce cost.” (March 21, 2007, Office Action, pages 19-20).

These conclusory statements fail to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark and Nakamura. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system. Nakamura teaches or suggests a heat conduction object 6 disposed in recess 7 of a circuit board 1.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack and Nakamura teaches away from lead frames and encapsulating IC packages since doing so would prevent the reduced mounting height configuration wherein the circuit board has heat sink disposed within an opening therein. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) or a method which involves disposing a heat sink attached to an IC chip in an opening in a circuit board (Nakamura) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention and the lead frame.

Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark and Nakamura. As stated, Wark teaches away from mounting

integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Nakamura teaches away from incorporating a lead frame, heat sink and decoupling device in an encapsulated IC package since it would be inconsistent with the objectives of Nakamura.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 1 and claim 17 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 1 and claim 17. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 1 and claim 17.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1. (March 21, 2007, Office Action, pages 16-17). Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claim 1 and claim 17. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any

motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

Dependent claim 17 recites "The integrated circuit package of claim 1, wherein the surface of the heat sink includes a recess in which the die-attach area is located." Appellants respectfully submit that Hernandez in view of Nakamura and Wark fails to teach or suggest the claim limitations of the elements of claim 17 and 1 from which claim 17 depends.

The Final Rejection is also silent as to additional claim limitations of elements of claims 1 and 17 which are neither taught nor suggested by Hernandez, Nakamura and Wark. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 1. Claim 1 recites "a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die." (emphasis added). Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28 but is not in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame, the heat sink plug cannot be the first portion of the electrically conductive heat sink element of claims 1 and 17. Nakamura teaches a heat sink 6 disposed in a recess in a circuit board 1. Nakamura lacks any teaching or suggestion of a lead frame and also cannot teach that the heat sink 6 is in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame as recited in claim 1. Wark lacks any teaching or suggestion of a heat sink. Thus,

Hernandez, Wark and Nakamura fail to teach or suggest the claim limitations of the elements of the claimed invention such as “a first portion of the heat sink facing the lead frame in proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame” as recited in claim 1.

Hernandez, Nakamura and Wark also fail to teach or suggest the element of the claimed invention directed to “the first portion of the heat sink [including] a recess in which the die-attach area is located.” Instead, the heat sink plugs of Hernandez and Nakamura lack any recess. Wark fails to teach or suggest a heat sink.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Nakamura teaches a heat sink disposed in a recess of a circuit board while Wark teaches a processor. None of the references teach the claim limitation of the element of the electrically conductive heat sink of claims 1 and 17. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 1 and 17 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the heat sink of Nakamura or the processor of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the heat sink of Nakamura or the teachings of Wark.

As Hernandez, Nakamura and Wark fail to teach or suggest the claim limitations of the elements of claim 17, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 17 obvious. Reconsideration and reversal of the rejection is requested.

**g. Claim 22 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hernandez in view of Wark.**

The discussion of Hernandez and Wark *supra* is incorporated herein.

Hernandez in view of Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 10 because Hernandez and Wark do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations

regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." (March 21, 2007, Office Action, page 16). The Examiner further stated "applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical." *Id.*

The Examiner further stated that "it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it provides low inductance devices in the system of Wark, and facilitate provision of the device of Hernandez." (March 21, 2007, Office Action, page 21). This simple conclusory statement fails to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the

electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Wark. As stated, Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 22 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 22. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 22.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body forming an area and having a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 22. Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat

sink element as contained in claim 22. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

By way of contrast with Hernandez and Wark, claim 22 recites "[a]n electronic system having an input device, an output device, a memory device, and a processor device coupled to the input, output, and memory devices, at least one of the input, output, memory, and processor devices including an integrated circuit package having a plurality of leads and a heat sink, the plurality of leads having reduced lead inductance comprising: a package body; an integrated circuit die positioned within the package body; a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area; and an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body forming an area and having a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink and the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." Appellants respectfully submit that Hernandez and Wark fail to teach or suggest the claim limitations of the elements of claim 22.

Specifically, Hernandez and Wark fail to teach or suggest the claim limitations of the elements of the claimed invention such as "an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the

package body forming an area and having a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink and the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.”

The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 22. Claim 22 recites “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 22. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28, not “in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink element of claim 22. Wark fails to teach or suggest a heat sink or lead frame.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Wark teaches a device for stacked integrated circuit dice. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claim 22. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claim 22 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the integrated circuit device of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the teachings of Wark.

As Hernandez and Wark fail to teach or suggest the claim limitations of the elements of

claim 22, and no motivation exists to modify the teachings of Wark, the proposed combination cannot render claim 22 obvious. Accordingly, the rejection of independent claim 22 should be reversed.

**h. Dependent Claims 34 and 35 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hernandez in view of Inasaka (U.S. Patent 5,136,471)**

The discussion of Hernandez and Inasaka *supra* is incorporated herein.

Hernandez in view of Inasaka cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 10 because Hernandez and Inasaka do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Inasaka to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears *prima facie* that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine these disclosures [of a package body coupled to a printed circuit board outside the package body] of the prior art because it would have facilitated the provision of the circuit board, signal voltage and reference voltage of the embodiment of Hernandez applied to claim 26.” (March 21, 2007, Office Action, page 19). These simple conclusory statements fail to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Inasaka.

Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Inasaka teaches or suggests a multilayer substrate 16 between a lead frame 32 and a chip 30 to form pads for power supply in a step-like configuration.

The references themselves teach away from any proposed combination thereof since Inasaka teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Applicants assert that it would not be obvious to combine a method for stacking power generating integrated circuit devices (Inasaka) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention. Further, no showing has been made of a likelihood of success that Hernandez could be modified by the teachings of Inasaka. As stated, Inasaka teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Further, connecting a decoupling capacitor to a printed circuit board would likely render the Hernandez device per se inoperable.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 34 or 35 which allow the heat sink to "reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries." The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 34 or 35. Thus, the Examiner's statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 34 or 35.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a

dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claims 25 and 34 or 35. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner’s statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants’ own disclosure.

#### **i. Dependent Claims 34**

Dependent claim 34 recites “The integrated circuit package of claim 26, wherein the heat sink is coupled to a printed circuit board outside the package body and is thereby coupled to one of a signal voltage and a reference voltage so the heat sink operates respectively as a signal plane and a ground plane for the plurality of leads of the lead frame.” Appellants respectfully submit that Hernandez in view of Inasaka fails to teach or suggest the claim limitations of the elements of claim 34 and claims 26 and 25 from which claim 34 depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 34 which are neither taught nor suggested by Hernandez and Inasaka. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the

claimed invention as recited in claim 25. Claim 25 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28 and not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink of claims 25 and 34. Inasaka lacks any teaching or suggestion of a heat sink.

Hernandez and Inasaka also fail to teach or suggest the element of the claimed invention directed to “the heat sink is coupled to a printed circuit board outside the package body and is thereby coupled to one of a signal voltage and a reference voltage so the heat sink operates respectively as a signal plane and a ground plane for the plurality of leads of the lead frame.” Inasaka fails to teach or suggest a heat sink and cannot cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Inasaka teaches a laminate wiring board. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 34. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 25 and 34 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the laminate wiring board of Inasaka. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the laminate wiring board of Inasaka.

As Hernandez and Inasaka fail to teach or suggest the claim limitations of the elements of claim 34, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 34 obvious. Reconsideration and reversal of the rejection is requested.

## **ii. Dependent Claim 35**

Dependent claim 35 recites “The integrated circuit package of claim 34, wherein the second portion of the heat sink projects substantially to one of a top and bottom of the package body.” Appellants respectfully submit that Hernandez in view of Inasaka fails to teach or suggest the claim limitations of the elements of claim 35 and claims 34 and 25 from which claim 35 depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 35 which are neither taught nor suggested by Hernandez and Inasaka. The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Claim 25 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28 and not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink of claims 25 and 35. Inasaka lacks any teaching or suggestion of a heat sink.

Hernandez and Inasaka also fail to teach or suggest the element of the claimed invention directed to “a second portion of the heat sink projects substantially to one of a top and a bottom of the package body.” Instead, the heat sink plug 60 of Hernandez only partially extends within a

package body 86. (Hernandez, FIGs. 21, 22). Inasaka fails to teach or suggest a heat sink and cannot cure the deficiencies of Hernandez.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Inasaka teaches a laminate wiring board. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 35. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 25 and 35 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the claim limitations regarding the features of the laminate wiring board of Inasaka. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the laminate wiring board of Inasaka.

As Hernandez and Inasaka fail to teach or suggest the claim limitations of the elements of claim 35, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 35 obvious. Reconsideration and reversal of the rejection is requested.

**i. Dependent Claims 34 and 35 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hernandez in view of Inasaka (U.S. Patent 5,136,471) and Wark.**

The discussion of Hernandez, Inasaka and Wark *supra* is incorporated herein.

Hernandez in view of Inasaka and Wark cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of dependent claim 35 because Hernandez and Inasaka do not teach or suggest all the claim limitations regarding the elements of the claimed invention. The Examiner has offered no motivation, either in references or within the knowledge of one skilled in the art, to modify or add features to Hernandez to include the claim limitations regarding the elements of the claimed invention. The Examiner has not identified any problem to be solved that would provide a reason to modify Hernandez. Further, the Examiner has made no showing of a reasonable expectation of success that Hernandez could be modified by Inasaka and Wark to include the claim limitations regarding the elements of the claimed invention.

With respect to Hernandez, the Examiner stated it would have been an obvious design choice to modify Hernandez to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” (March 21, 2007, Office Action, page 16). The Examiner further stated “applicant has not disclosed that, in view of the applied prior art, the particular inductance is for a particular unobvious purpose, produces an unexpected results, or is otherwise critical, and it appears prima facie that the process would possess utility using another process. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.” *Id.*

The Examiner further stated that “it would have been obvious to combine this disclosure [of a processor] of Wark with the disclosure of Hernandez with the disclosure of Hernandez because it would facilitate the provision of the device of Hernandez.” (March 21, 2007, Office Action, page 18). The Examiner further stated that “it would have been obvious to combine these disclosures [of a package body coupled to a printed circuit board outside the package body] of the prior art because it would have facilitated the provision of the circuit board, signal voltage and reference voltage of the embodiment of Hernandez applied to claim 26.” (March 21, 2007, Office Action, page 19).

This simple conclusory statements fail to identify any problem to be solved by any knowledge in the art to modify Hernandez to include the teachings of Wark and Inasaka. Hernandez teaches suppressing noise by incorporating a decoupling capacitor in an IC package. In an embodiment, a heat sink is attached to an IC chip. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system. Inasaka teaches or suggests a multilayer substrate 16 between a lead frame 32 and a chip 30 to form pads for power supply in a step-like configuration.

The references themselves teach away from any proposed combination thereof since Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the stack. Inasaka also teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the multilayer substrate. Applicants assert that it would not be obvious to combine a method for

stacking heat generating integrated circuit devices (Wark) or power generating integrated circuit devices (Inasaka) with a method of including a decoupling capacitor and heat sink plug in an IC package of Hernandez since to do so would destroy the invention of Hernandez. Even assuming the combination could be made, it would require that Hernandez exclude the heat sink plug 60 which the Examiner correlates (improperly) to the electrically conductive heat sink element of the claimed invention.

These arguments are also misleading as the Examiner is not focusing on the correct claim limitation. The arguments ignore the structural limitations of the heat sink element of claim 25 and claim 34 or 35 which allow the heat sink to “reduce the lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The appropriate inquiry is not whether it would be obvious to reduce the lead inductance by a particular amount, but rather whether it would be obvious to modify the decoupling capacitor of Hernandez to include the structural limitations of the heat sink element of claim 25 and claim 34 or 35. Thus, the Examiner’s statements are insufficient to establish a prima facie case of obviousness because they fail to address the fact that the decoupling capacitor of Hernandez does not include the claim limitation of the elements of the electrically conductive heat sink as contained claim 25 and claim 34 or 35.

The decoupling capacitor of Hernandez has a different geometry and relationship to the other components than the claimed invention. The decoupling capacitor of Hernandez is a dielectric layer separated by two conductors (Hernandez, col. 7, lines 21-25). The Examiner cites no authority for the proposition that the Hernandez decoupling capacitor *could* reduce “lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.” The Office Action is silent as to *how* Hernandez could be modified to include the claimed element of the invention directed to “an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in claim 25. Similarly, the Office Action is silent as to *why* one skilled in the art would be motivated to modify the Hernandez decoupling capacitor to meet the claim limitations. (*Id.*)

The Examiner has not identified any problem to be solved in Hernandez that would lead

one of skill in the art to modify the decoupling capacitor to be the electrically conductive heat sink element as contained in claims 25 and 34 or 35. Indeed, Hernandez teaches preventing the coupling of undesirable high frequency noise by adding a decoupling capacitor to an IC lead frame, not the claimed heat sink element. The Examiner has simply failed to identify any motivation to modify the decoupling capacitor of Hernandez to include the heat sink claim element of the claimed invention.

The Examiner's statements in the Final Rejection are merely conclusions based on a hindsight reconstruction of the claimed invention based on Appellants' own disclosure.

**i. Dependent Claim 34**

Dependent claim 34 recites "The integrated circuit package of claim 26, wherein the heat sink is coupled to a printed circuit board outside the package body and is thereby coupled to one of a signal voltage and a reference voltage so the heat sink operates respectively as a signal plane and a ground plane for the plurality of leads of the lead frame." Appellants respectfully submit that Hernandez in view of Inasaka and Wark fails to teach or suggest the claim limitations of the elements of claim 34 and claims 26 and 25 from which claim 34 depends.

The Final Rejection is silent as to additional claim limitations of elements of claims 25 and 34 which are neither taught nor suggested by Hernandez, Wark and Inasaka. The decoupling capacitor 34, 68 of Hernandez cannot be the "electrically conductive heat sink" element of the claimed invention as recited in claim 25. Claim 25 recites "a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die." (emphasis added).

Even assuming the decoupling capacitor 34, 68 is in "close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads" which Appellants do not concede, the decoupling capacitor 34, 68 does not have a "die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die" as recited in claim 25. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28 and not in

“close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink of claims 25 and 34. Wark and Inasaka lack any teaching or suggestion of a heat sink.

Hernandez, Wark and Inasaka also fail to teach or suggest the element of the claimed invention directed to “the heat sink is coupled to a printed circuit board outside the package body and is thereby coupled to one of a signal voltage and a reference voltage so the heat sink operates respectively as a signal plane and a ground plane for the plurality of leads of the lead frame.” Inasaka and Wark fail to teach or suggest a heat sink and cannot cure the deficiencies of Hernandez.

As Hernandez, Wark and Inasaka fail to teach or suggest the claim limitations of the elements of claim 34, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 34 obvious. Reconsideration and reversal of the rejection is requested.

## **ii. Dependent Claim 35**

Dependent claim 35 recites “The integrated circuit package of claim 34, wherein the second portion of the heat sink projects substantially to one of a top and bottom of the package body.” Appellants respectfully submit that Hernandez in view of Inasaka and Wark fail to teach or suggest the claim limitations of the elements of claim 35 and claims 34 and 25 from which claim 35 depends.

The decoupling capacitor 34, 68 of Hernandez cannot be the “electrically conductive heat sink” element of the claimed invention as recited in claim 25. Claim 25 recites “a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body *and* with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die.” (emphasis added). Even assuming the decoupling capacitor 34, 68 is in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads” which Appellants do not concede, the decoupling capacitor 34, 68 does not have a “die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die” as recited in

claim 1. Instead, the decoupling capacitor 34, 68 is attached to the heat sink and lead frame, but not the IC chip 28. (Hernandez, col. 7, lines 31-33).

As the Hernandez heat sink plug 60 is solely located beneath an IC chip 28 and not in “close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of the leads,” the heat sink plug cannot be the first portion of the electrically conductive heat sink of claims 25 and 35. Inasaka and Wark lack any teaching or suggestion of a heat sink.

Hernandez teaches a capacitor that can be incorporated in a molded IC package. Inasaka teaches a laminate wiring board and Wark teaches a processor. Neither reference teaches the claim limitation of the element of the electrically conductive heat sink of claims 25 and 35. The decoupling capacitor of Hernandez is structurally different from the element of the electrically conductive heat sink of claims 25 and 35 and the Examiner has not stated what would motivate a person of skill in the art to modify the decoupling capacitor of Hernandez to include the features of the laminate wiring board of Inasaka or the processor of Wark. No problem in the art has been identified that would motivate one skilled in the art to modify Hernandez. Further, the Examiner has failed to show a reasonable expectation of success that the decoupling capacitor of Hernandez could be modified with the laminate wiring board of Inasaka or the processor of Wark. Connecting a decoupling capacitor to a printed circuit board and processor would likely render the Hernandez device per se inoperable.

Hernandez, Inasaka and Wark also fail to teach or suggest the element of the claimed invention directed to “a second portion of the heat sink projects substantially to one of a top and a bottom of the package body.” Instead, the heat sink plug 60 of Hernandez only partially extends within a package body 86. (Hernandez, FIGs. 21, 22). Inasaka and Wark fail to teach or suggest a heat sink and cannot cure the deficiencies of Hernandez.

As Hernandez, Inasaka and Wark fail to teach or suggest the claim limitations of the elements of claim 35, and no motivation exists to modify the teachings of Hernandez, the cited art cannot render claim 35 obvious. Reconsideration and reversal of the rejection is requested.

8) CLAIMS APPENDIX

A copy of claims 1-4, 6, 8-12, 14-20, 22, 24-29, 31, 33-37 and 39-45 is appended hereto as Appendix A.

9) EVIDENCE APPENDIX

There is no evidence appendix.

10) RELATED APPEALS APPENDIX

There is no related appeals appendix.

## CONCLUSION

Appellants respectfully submit that claims 1-4, 6, 8-12, 14-20, 22, 24-29, 31, 33-37 and 39-45 are allowable. Appellants respectfully request that the rejection of claims 1-4, 6, 8-12, 14-20, 22, 24-29, 31, 33-37 and 39-45 under 35 U.S.C. §102(b) and 35 U.S.C. § 103(a) be reversed.

Respectfully submitted,



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JRD/lmh

**APPENDIX A**

**Claims Appendix**

**Claims 1-4, 6, 8-12, 14-20, 22, 24-29, 31, 33-37 and 39-45**

**U.S. Patent Application No. 09/538,684**

**Filed March 30, 2000**

1. An integrated circuit package having a plurality of leads and a heat sink, the plurality of leads having reduced lead inductance comprising:  
a package body;  
an integrated circuit die positioned within the package body;  
a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area; and  
an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.

2. The integrated circuit package of claim 1, wherein the package body includes one of a transfer molded plastic package body and a preformed ceramic package body.

3. The integrated circuit package of claim 1, wherein the integrated circuit die includes one of a Dynamic Random Access Memory integrated circuit die, a Static Random Access Memory integrated circuit die, a Synchronous Dynamic Random Access Memory integrated circuit die, a Sequential Graphics Random Access Memory integrated circuit die, a flash Electrically Erasable Programmable Read-Only Memory integrated circuit die, and a processor integrated circuit die.

4. The integrated circuit package of claim 1, wherein the lead frame includes one of a peripheral-lead finger lead frame, a Leads Over Chip lead frame, and a Leads Under Chip lead frame.

6. The integrated circuit package of claim 1, wherein the heat sink is coupled to the reference voltage through one of a wirebond, a conductive adhesive, and a welded connection.

8. The integrated circuit package of claim 1, wherein the heat sink is positioned only partially within the package body.

9. The integrated circuit package of claim 1, wherein the heat sink is coupled to a printed circuit board outside the package body thereby coupled to one of a signal voltage and a reference voltage.

10. The integrated circuit package of claim 8, wherein the second portion of the heat

sink projects substantially to one of a top and a bottom of the package body.

11. The integrated circuit package of claim 1, wherein the heat sink is positioned within the package body with the surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame.

12. The integrated circuit package of claim 1, wherein the heat sink is positioned within the package body with its first portion extending substantially to at least one side of the package body.

14. The integrated circuit package of claim 1, wherein the first and second portions of the heat sink are integral with one another.

15. The integrated circuit package of claim 1, wherein the first and second portions of the heat sink comprise separate parts.

16. The integrated circuit package of claim 1, wherein the heat sink comprises a plurality of parts, each forming a portion of both the first and second portions of the heat sink.

17. The integrated circuit package of claim 1, wherein the surface of the first portion of the heat sink includes a recess in which the die-attach area is located.

18. The integrated circuit package of claim 1, wherein the heat sink has locking holes therein for locking the heat sink in the integrated circuit package.

19. The integrated circuit package of claim 1, further comprising an adhesive attaching the lead frame to the heat sink.

20. The integrated circuit package of claim 1, wherein the integrated circuit package comprises one of a Vertical Surface Mount Package, a Small Outline J-lead package, a Thin Small Outline Package, a Quad Flat Pack, and a Thin Quad Flat Package.

22. An electronic system having an input device, an output device, a memory device, and a processor device coupled to the input, output, and memory devices, at least one of the input, output, memory, and processor devices including an integrated circuit package having a plurality of leads and a heat sink, the plurality of leads having reduced lead inductance comprising:

a package body;

an integrated circuit die positioned within the package body;

a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area; and

an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a

substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body forming an area and having a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink and the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.

24. An integrated circuit package having a plurality of leads and a heat sink, the plurality of leads having a reduced lead inductance comprising:

- a package body;
- an integrated circuit die positioned within the package body;
- a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area; and
- an electrically conductive heat sink positioned at least partially within the package body with a vertically extending columnar portion surrounded by a horizontally extending skirt portion having a vertical thickness, said columnar portion having a vertical thickness which is greater than the vertical thickness of said skirt portion, and having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least

eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body, the die-attach surface being attached to the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.

25. An integrated circuit package having heat sink and a plurality of leads having a reduced lead inductance comprising:  
an integrated circuit die;  
a lead frame including a plurality of leads having portions that are connected to the integrated circuit die, the plurality of leads forming an area; and  
an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink coupled to one of a signal voltage and a reference voltage for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries.

26. The integrated circuit package of claim 25, further comprising a package body.

27. The integrated circuit package of claim 26, wherein the package body includes one of a transfer molded plastic package body and a preformed ceramic package body.

28. The integrated circuit package of claim 25, wherein the integrated circuit die includes one of a Dynamic Random Access Memory integrated circuit die, a Static Random Access Memory integrated circuit die, a Synchronous Dynamic Random Access Memory integrated circuit die, a Sequential Graphics Random Access Memory integrated circuit die, a flash Electrically Erasable Programmable Read-Only Memory integrated circuit die, and a processor integrated circuit die.

29. The integrated circuit package of claim 25, wherein the lead frame includes one of a peripheral-lead finger lead frame, a Leads Over Chip lead frame, and a Leads Under Chip lead frame.

31. The integrated circuit package of claim 25, wherein the heat sink is coupled to the reference voltage through one of a wirebond, a conductive adhesive, and a welded connection.

33. The integrated circuit package of claim 26, wherein the heat sink is positioned only partially within the package body.

34. The integrated circuit package of claim 26, wherein the heat sink is coupled to a

printed circuit board outside the package body and is thereby coupled to one of a signal voltage and a reference voltage so the heat sink operates respectively as a signal plane and a ground plane for the plurality of leads of the lead frame.

35. The integrated circuit package of claim 34, wherein the second portion of the heat sink projects substantially to one of a top and a bottom of the package body.

36. The integrated circuit package of claim 26, wherein the heat sink is positioned within the package body with the surface of its first portion in close proximity to substantially all of the enclosed portion of each of the plurality of leads of the lead frame.

37. The integrated circuit package of claim 26, wherein the heat sink is positioned within the package body with its first portion extending substantially to at least one side of the package body.

39. The integrated circuit package of claim 25, wherein the first and second portions of the heat sink are integral with one another.

40. The integrated circuit package of claim 25, wherein the first and second portions of the heat sink comprise separate parts.

41. The integrated circuit package of claim 25, wherein the heat sink comprises a

plurality of parts, each forming a portion of both the first and second portions of the heat sink.

42. The integrated circuit package of claim 25, wherein the surface of the first portion of the heat sink includes a recess in which the die-attach area is located.

43. The integrated circuit package of claim 25, wherein the heat sink has locking holes therein for locking the heat sink in the integrated circuit package.

44. The integrated circuit package of claim 25, further comprising an adhesive attaching the lead frame to the heat sink.

45. The integrated circuit package of claim 25, wherein the integrated circuit package comprises one of a Vertical Surface Mount Package, a Small Outline J-lead package, a Thin Small Outline Package, a Quad Flat Pack, and a Thin Quad Flat Pack.